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#30 November 1981

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NOVEMBER 1981 #30

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Publishers
NORMAN JACOBS
KERRY O'QUINN

Associate Publisher
RITA EISENSTEIN

Circulation Director
RICHARD BROWNE

Editor
BOB WOODS

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CHEH NAM LOW

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DAVID HUTCHISON

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Contributors This Issue: Kent Bash, Malcolm Brenner, Ronald Carter, Anton Corbijn, Howard Cruse, Don Dougherty, Fred Durant III, David Fleischer, Leigh Grau, Ronald F. Hall, Michael Hannigan, Jay Kay Klein, John C. Lautsch, Jane MacKenzie, Ed Naha, Bob Nichols, James Oberg, Tobias Owen, Pat Rawlings, Raymond Rue, Becky Sharp, Andrei Sokolov, Walter Velez, Ron Walotsky, Janny Wurts.

For Advertising Information: Rita Eisenstein: (212) 689-2830.

ON THE COVER: The way things are going, it is very likely that the Russians will have established the first space colony by the turn of the century—while the U.S. is still debating its economic feasibility. For more information on the U.S.S.R. space program, see Jim Oberg's article on page 14. Art: © 1981 Walter Velez.

output

Longing . . .

John Carpenter's recent movie *Escape From New York* is a melodramatic projection of the future.

In the film, Manhattan has been transformed into a massive, unregulated maximum security prison. The whole island! Don't ask what happened to all the residents, the top people of almost every profession on Earth, the millions who put their life savings into Manhattan property or built businesses there. Don't ask why the government selected the world's greatest city for "housing" the scum of the country (rather than some warm, useless, remote island) or how the rest of the American body survives without its heart and mind.

Don't ask, because you won't find logical answers to those, and many other basic questions, in the film. So—it's a bit far-fetched; so what. Once you swallow the film's premise and go along with it, the action is exciting and well-directed, and the art direction and set design are outstanding.

But the world that Carpenter shows us—the future he envisions—is not a happy place. It is made of menace and destruction, torture and brutality, force and violence. It is dark and bleak and dangerous. The world of the future, as seen in *Escape From New York*, has not improved from where we are today—instead it has nose-dived in the opposite direction.

Think about all the other films you've seen that project a future society: *THX-1138* was a world of sterile, confined void. *Soylent Green* showed us a society of nightmare horrors. *Logan's Run* looked like an ideal culture on the surface, but underneath it was thoroughly perverted. *Outland* and *Alien* pictured the exploration of space as frightening, inimical to human values and life. And the classic futuristic projection, *1984*, summed it all up by envisioning a future world in which sex, individuality, creativity, intellect and every other positive human quality has been sanded down to a smooth, bland ZERO.

The same is true of almost every movie and book I can think of that projects the world of the future. They are negative and/or depressing.

Now, there are lots of good dramatic reasons for creating fictional worlds of the future that are variations on hell. For one thing, these stories warn us about present trends carried to their end results, and for another, they allow for outstanding heroes who shine in bright contrast to the drab, evil inhabitants who populate those grey tomorrows.

Still, I find myself longing. . . yearning for a view I've *never* seen, a view that must surely hold appeal for every reader of this magazine, a view of the future as it might be if things *improve*. . .

I long for the projection of an *ideal society*, just so I can see—in concrete Technicolor terms—what it is that we're all wishing for and working toward. I long for vision of the future that is sunlit and productive and successful and rational—the kind of world where I would like to live.

But projecting an ideal world is a tremendously difficult task for a writer—much more difficult than merely dramatizing one's worst fears. For one thing, it requires that the writer have some *solutions* to fundamental social problems and be able to show how the "right way" would work. That's not easy thinking—and it demands a lot more abstract mental creativity than does exciting action (although scripting good action is not to be underestimated either).

And I guess the gigantic difficulties are the reasons why we see so little in the way of idealistic movies and books and theater nowadays. The talent to whine and complain and be cynical and shout doom has been defined in the last few decades by many skilled writers, but what we—the futurists—long to see is a new breed of writer who not only has the technical skills of the language craft but who also has the clear mental ability to see into the future—as it *ought* to be.

Kerry O'Quinn/Publisher

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SHUTTLE LAUNCH

. . . Congratulations on your spectacular coverage of the launch of the *Columbia*. Your three articles and centerspread has made #28 the best FUTURE LIFE ever!

That launch was the greatest step Americans have taken toward a better future since Skylab. I am glad to see that you were on top of the action.

Ted Apelt
Miami, FL

. . . Just a few words about your articles on the space shuttle (FUTURE LIFE #28). They all were great, but your photos of the launch were the best I have seen.

I was up at 5:30 a.m., Friday, to watch the first launch. I had my video recorder set to record at 5 a.m. I even called my mother to have her keep me informed.

Come Sunday at 5 a.m. I was up again and the recorder set again. In my gut I could feel the tension building as they came closer to the first hold. But when they said, "One, zero, ignition," and that sucker lit and started lifting, I was in my chair telling it "Go! Go! Go!" I ran into the bedroom to wake up my wife so she would not miss the launch but since she was not too thrilled about either one (waking up or the launch), she lay down on the sofa and went to sleep.

In closing I hope and pray that this magazine will promote more people to think, talk and go into space. I know if they *ever* want a guinea pig they can use yours truly (me!).

Donald G. Rutherford
Irving, TX

CREDIT RISK

. . . Mr. Donald A. Webster's comment in FUTURE LIFE #28 ("A beautiful woman is a credit to her sex.") proves to everyone that he is most certainly *not* a credit to his sex.

Toni Lay
Bronx, NY

MUSICAL RUSH

. . . I've finally decided to write you about something that has been greatly neglected: Modern music as art. I don't mean the usual synthesizer and sound effects that are trapped in our definition of "modern" music. I am referring to the traditional sound of heavy metal rock and roll, which has developed a very unfavorable stereotype in my point of view. Heavy metal need not be a cacophony of raspy voices and repetitive guitar riffs.

There is one group, however, that has managed to rise above the glut of so-called supergroups and bring out the art in their music. They're called Rush, a trio of musical artists from Canada. In their seven years of existence, Rush has not sacrificed their integrity as artists just to get a few big bucks.

One of the most notable aspects of Rush is their interest in science fiction, fantasy and mythology. Many of their songs reflect this attitude, such as "By-Tor and the Snow Dog," in which By-Tor, the Prince of Darkness, rises from Hell to do battle with the Snow Dog in the overworld. Rush's epic "2112" tells the story (in a 20-minute song) of a man in the future who thought he had a good life, but then he found something that changed it all. In "Cyngus X-1" a man confronts a black hole and soon finds himself in the midst of a battle of the gods in Olympus.

Rush consists of Geddy Lee on bass guitar and vocals and keyboards, Alex Lifeson on electric and acoustic guitars, and Neil Peart, Rush's lyrical wizard, on drum kit. Being the highly reputable publication it is, I think FUTURE LIFE should print an in-depth article on Rush—a group whose depth and inspiration should be shared with all FUTURE LIFE readers.

Richard Green
Garden Grove, CA

AT THE WED-ING

. . . I was passed along a copy of FUTURE LIFE #28 with the nice mention of Walt Disney World ("Summertrek II"). Thanks again for thinking of us.

It might boost your ego to know that I see more copies of FUTURE LIFE laying around and hanging on the walls at WED (the imagineers hangout) than any other publication.

Bob Mervine
Walt Disney World
Lake Buena Vista, FL

EXAMINING THE RAINBOW

. . . My thanks for the excellent story "Over the Rainbow" by Robert A. Heinlein (FUTURE LIFE #28). One can only wish that we had a president like the woman he depicts in the story.

The story has all the makings of a very good novel.

Robert S. Kennedy, Jr.
Camarillo, CA

. . . I am now firmly convinced that Robert Heinlein would be gainfully employed writing either ads for Mobil, or Ronald Reagan's speeches; his simplistic "answers" to nuclear waste would fit well in both.

After branding anti-nuclear people with the term "anti-technologists," he hands us such ridiculous statements such as: nuclear waste is no more difficult to handle than ashes; it can be stored in glass bricks, etc. Unfortunately, none of these statements are true. There is ample evidence showing the health dangers of low-level radiation (waste), as well as high-level. (Dr. John Gofman, M.D., Ph.D., who worked ten years in the Atomic Energy Commission, states that up to 32,000 extra cancer deaths would occur annually if every American received the "maximum permissible dose.") Also, the glass encasement process has long been shown not to work; due to its heat and radioactivity, the waste leaches out of the glass. Metal is no bet-

"Mr. Dinwoodie, whatever it was you had the last time. . . you've got another one."

ART © 1981 DON DOUGHERTY

ter. Does Heinlein know that in 1973, 115,000 gallons of high-level waste leaked out of a Hanford, Washington, dump? What does he say about this junk emerging in the food chain? Did he hear about Edward Gleason, Jr., who was contaminated by an unmarked box of liquid n-waste and died ten years later at the age of 39, from a rare form of cancer that first took his arm and shoulder? And how does he justify the catastrophic risk of meltdowns? (That old saw about other risks being just as bad just doesn't make sense to me; comparing nuclear accidents with automobile fatalities, for instance, is useless unless you believe that one risk justifies the other.)

The small amount of power atomic energy supplies could be replaced many times over by other energy sources: solar (passive and photovoltaic), wind, tidal, OTEC (Ocean Thermal Energy Conversion), alcohol, methane, geothermal and others. But even then, most nuclear proponents will reject them out of hand...after all, the oil companies themselves say they're no good! The fact that Mobil and Exxon have heavy nuclear investments is coincidental, I guess.

I would like to recommend that Mr. Heinlein write to the Union of Concerned Scientists, 1384 Massachusetts Ave., Cambridge, MA 02238, or Physicians for Social Responsibility, Inc., P.O. Box 144, Watertown, MA 02172. These two groups, among others, have views quite different from the uncritical optimism of the nuclear industry and its supporters.

John P. Morgan
Keansburg, NJ

BECAUSE IT IS WHERE?

...Re: Earth Control by Bob Woods in FUTURE LIFE #27. As a mountaineer, I've heard the phrase "because it is there" credited to many people, but never to Admiral Bird (*sic*). For the record, forever and ever, it was said by Everester George Leigh-Mallory in 1923 while on a lecture tour in Philadelphia, of all places. Fame indeed is fleeting.

Gordon H. Palmer
Thousand Oaks, CA

FUELING AROUND

...A lot of guff has been written about alternative energy and fuel sources but has anyone yet conceived of anything is appropriate as fuelless power?

I've not yet tried the principle practically, but it is not too difficult. It's a system of energy and propulsion initially using an electric motor driven by a battery. Linked to this is a second battery and a dynamo. When your battery runs down you simply use the energy from the second battery and charge up the first (ad infinitum) with the dynamo which is turned by the motor, energized in this instance by the second battery.

Larger and smaller batteries and motors can be used and very little energy is used by the dynamo. The theory is that the system keeps on going until something wears out. The controls needed are not complicated.

According to applicable theories the battery ought to last an hour whereas the charging takes only 20 minutes.

Voila! Fuelless power!
Peter Haylett
Pretoria, South Africa

RED BLOODED

...James E. Oberg's article "Medical Barriers in Space" (FUTURE LIFE #27) was quite interesting, but somewhat incomplete. For instance, on page 42, he states that red blood cells manufactured after being in space about one month are structurally different from those manufactured on Earth, but he doesn't explain what that difference is.

I'm curious about this phenomenon. Where can I learn more about it?

William Olson
Eau Claire, WI

Sorry. According to Jim Oberg, nothing more specific is known other than that there was a change.

A MATTER OF GRAVITY

...I have a single qualm concerning Ed Naha's article, "*Outland*, 'High Noon' in Space." (FUTURE LIFE #27) I quote: "Other major sets included a future jail, consisting of glass-fronted cubicles devoid of artificial gravity (the prisoners float helplessly inside, moored only by oxygen lines)..." This statement is accurate in relation to the movie, but is it accurate? The mining camp is on Io; Io has mass: Io has gravity. Artificial gravity? How is it affected? It is evident—*in* the movie. Inside the mining complex the gravity appears to be roughly equivalent to Earth's; outside, it seems to be that of our own Moon (only guessing); and in the futuristic jail there is none at all. Again, how is this so? Are they being accelerated? No. A space station can be rotated—is the mining camp being rotated independently of Io? Of course not. Could it be some mysterious force discovered in our future? Unlikely. *Outland* doesn't appear to

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input

be very far in the future.

Am I wrong? Is there a way? If not, I can only be disappointed that there cannot be more concern with speculation based on current information as well as the visual side of science fiction movies.

Kerry Setler
Logan, UT

You are not the only one to spot factual errors in that film—see Harlan Ellison's column for more outlandish fictions.

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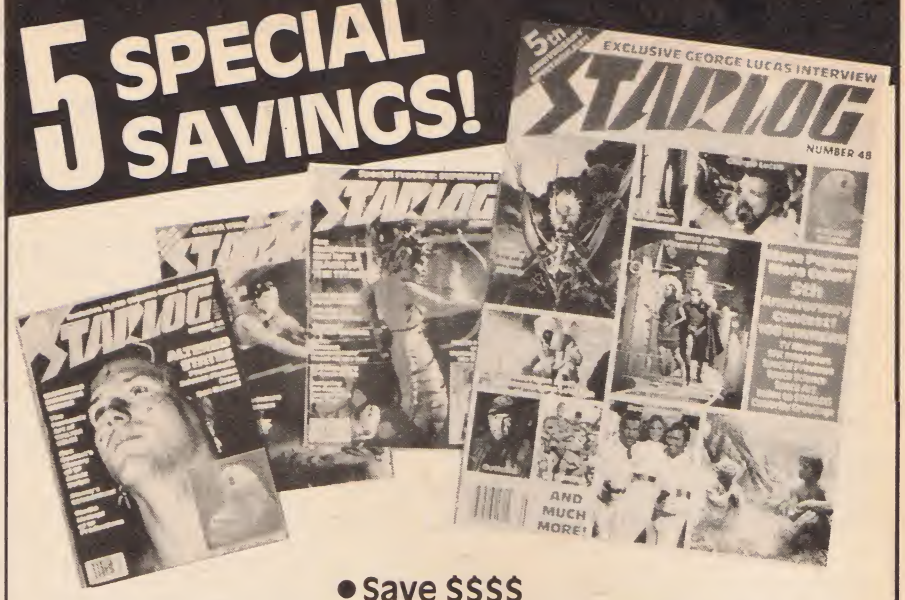

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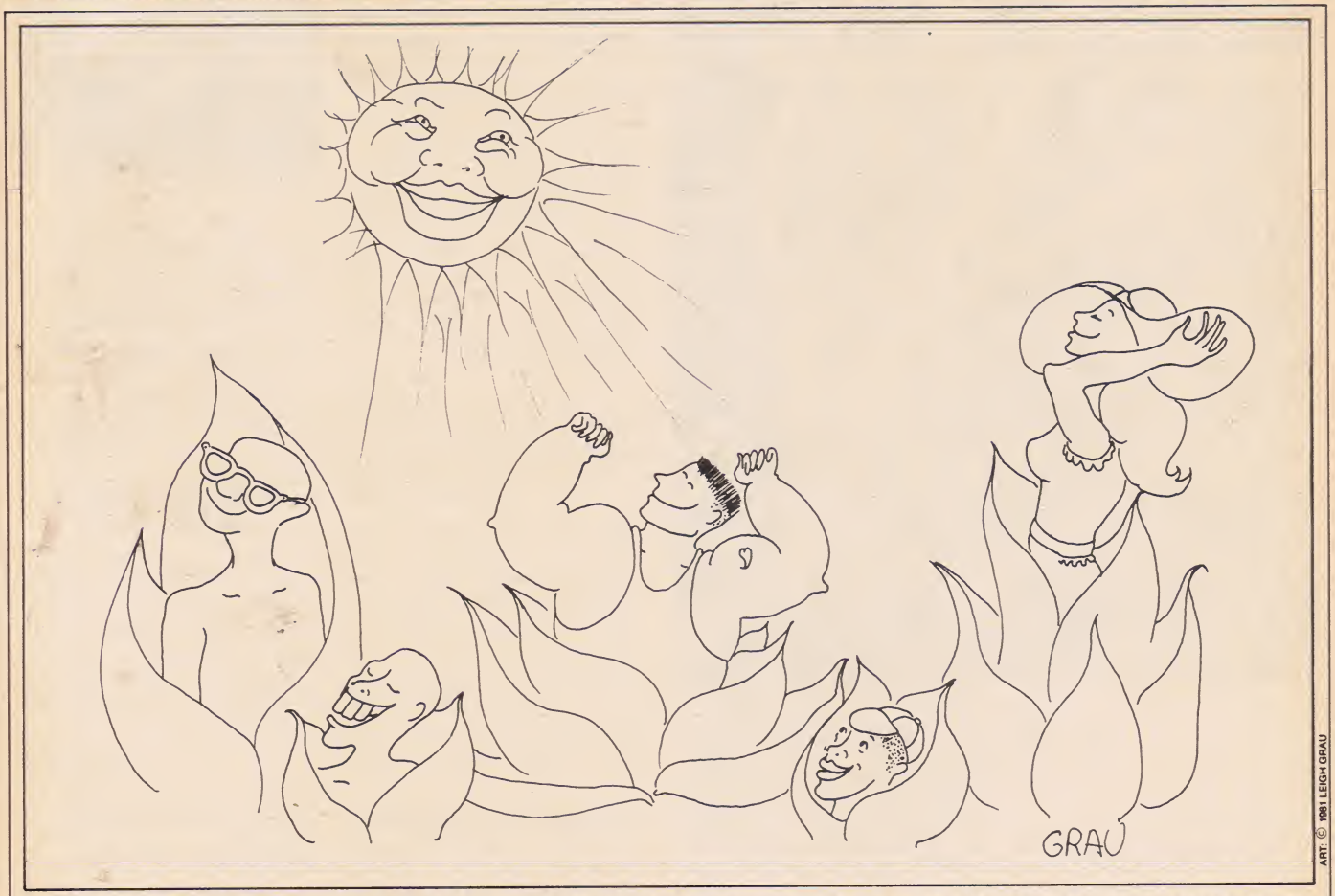

LIGHT NEWS

A SUNNY DEPOSITION

Ever wonder why people claim to be happier when summer and all its sunshine comes around? Or why spring seems to turn young men's fancies toward romance? Why there are so many sun worshipers? Well, recent studies may reveal some answers. The tests center around the body's production of the hormone melatonin, secreted by the pineal gland. The hormone is known to affect animal behavior, but is now being related to human biology to explain variances in such areas as mood and fertility.

It is generally assumed that humans have evolved beyond profound hormonal effects of light, unlike lower animals, in whom light determines the reproductive cycle and many other daily and seasonal rhythms. Human biorhythms are believed to have become more dependent on psychosocial factors. The new studies, however, are leading to a reexamination of the properties of natural versus artificial light sources and the differences in seasonal light and dark cycles.

Melatonin is produced during nighttime hours, following a rather roundabout journey. Light enters through the eye to the optic nerve, part of which goes to the brain's vision center and the other part to the hypothalmus, often referred to as the body's internal clock. The light-generated nerve messages finally work their way to the spinal cord and then to the pineal gland, located in the brain.

Dr. Alfred Lewy, a research psychiatrist, has been studying the effects of the hormone's level on human behavior. For instance, some people, according to the study, may have adapted to low-level artificial light while remaining sensitive to more intense natural light. This finding may have a bearing on mental illnesses that appear to be seasonal. For example, in the temperate and polar regions there are reportedly seasonal patterns in depression, mania and suicide attempts.

In a related study, conducted by Dr. Lewy while he was with the National Institute of Mental Health, a manic depressive who suffered severe depression during the winter was exposed to intense natural-type light for six hours per day—three hours at dawn and three more at dusk. As a result, the man's depression lifted in four days, and he has remained well since. "In a sense we made spring come earlier for him," Dr. Lewy says.

Other studies have led to criticism of indoor lighting that distorts the natural spectrum of the sun. It has been suggested that artificial light be redesigned to more closely mimic the sun, or that people spend more time outside and keep doors and windows open when possible.

You might want to clip this out and hand it to your boss as your excuse for taking that two-hour lunch at the park.

—Bob Woods

PHOTO EXPLORATORIUM

The subtle architecture of the inner structure of a seashell is revealed through x-ray photography. This photo is part of an exhibit currently showing at San Francisco's Exploratorium.

TELEVISION

NEWS FLASH

Sometimes it seems as if the news directors of the major television networks believe that American adults have a collective attention span of about 10 minutes or less. At least, this is the theory behind the latest flood of TV "news magazines." These time fillers purport to provide their audience with an "inside look" at some topic or other—then proceed to bombard the hapless viewer with several minutes of disconnected images, carefully edited interviews, and wrap-ups by well-groomed and seriously self-righteous actors. This is called "in-depth reporting."

This summer, for example, we were treated to an interesting member of the species entitled *Walter Cronkite's Universe* (Mr. Cronkite's universe being, of course, of a different quality than the one the rest of us inhabit). Like most of the other science programs that television is fond of producing (with the notable exception of *Nova*), *WC's Universe* skims over several topics per episode in the sort of scientific fervor that leaves viewers impressed but not terribly enlightened. For example, the premiere episode featured Mr. Cronkite taking a submarine ride in the Pacific Ocean to look at luminescent fish; Charles Osgood reporting on the use of technology to uncover art fraud; and a presentation of the process of crystallization—all in 30 minutes (with commercials).

PHOTO CBS

Walter Cronkite & his universe.

If this trend continues—and it shows no indications of slowing—we will probably soon be treated to the edifying spectacle of a photogenic reporter with a B.A. in Television Sincerity confidently expounding upon the subtleties of Einstein's Theory of Relativity—inside a five minute time slot.

—Becky Sharp

IN THE STARS

THE NAME GAME

Everybody's heard the old saying, "A fool and his money are soon parted," and there are a multitude of entrepreneurs who are quite willing to try it out. Such past popular classics as the Pet Rock and Bottled New York Air are moving testimonials to the ability of the American public to swallow anything.

The latest entry in the "Nothing for Something" contest appears to be a surefire winner—the International Star Registry. This interesting little outfit, based in Northfield, Illinois, has been doing a lot of advertising lately both in magazines and on the radio, offering a product that few science fiction fans will be able to resist: their own star.

"The International Star Registry," reads one of their ads, "has devised a method for people to actually have stars in the universe named anything they choose. And whatever name they give to the star becomes permanently registered at I.S.R. world headquarters in Geneva, Switzerland, forever....By registering a star in someone's name, you can actually give the rare gift of immortality. Not to mention the ultimate in permanent status symbols."

What more could one ask? For a "modest $30 registration fee" ($60 if you want to name a binary) you not only get a set of astronomical charts marked to show your star in relation to all the major galaxies (a pretty neat trick in itself), a letter of authenticity and a personalized certificate suitable for framing; but you also achieve immortality! A memorial that will last longer than the pyramids! You can almost picture a stalwart starship commander in the year 3000 announcing to his crew, "We are now in orbit around the Harold Skimpole star." A bargain at the price, right?

Wrong.

In fact, according to the folks at the Hayden Planetarium, located in New York City's American Museum of Natural History, most scientists don't refer to the proper names of stars at all. While official star names are, for the most part, Arabic translations of Greek or Babylonian nomenclature, scientists commonly refer to their objects of study either by their Latin descriptions (e.g. Alpha Cygni, meaning "the brightest star in the Cygnus constellation"), or by their numerical designations in one of several catalogs describing stellar properties. "Breaking into this system with a non-astronomical, thus trivial, name," say the Hayden people, "would be unacceptable to the astronomical community." So while you have the perfect right to go ahead and pay $30 to get a star named after your pet cat, the only one who will recognize that name as valid will be you (and possibly the cat).

But wait, a few stubborn souls may object, what about such things as Moon craters and mountains on Mars? They're named after people, aren't they?

Sure—but there's a catch. "There are international committees responsible for naming features on the Moon and on the newly observed surfaces of planets and their satellites," report the Hayden astronomers. "Two criteria must be met for naming, say, a crater. First, the individual should be worthy of the honor. And second, he or she must be dead."

Any volunteers?

—Barbara Krasnoff

HARRIS POLL

SHUTTLE SUPPORT

The blazing success of the space shuttle's maiden flight has had a dramatic effect on the American public, with a substantial 76 percent calling it "a major breakthrough for U.S. technology and know-how," according to a recent poll taken by the Louis Harris Survey.

It's often been complained that this country wastes money by sending men to the Moon or launching a spaceship that goes nowhere. But this latest poll firmly attests that the majority of Americans believe that the shuttle program is worth it. Indeed, a 63-33 percent margin now feels it is worthwhile for the U.S. government to spend several billion dollars to develop the full potential of the space shuttle over the next 10 years. Even in these budget-cutting days it is apparent that people are willing to finance the space program.

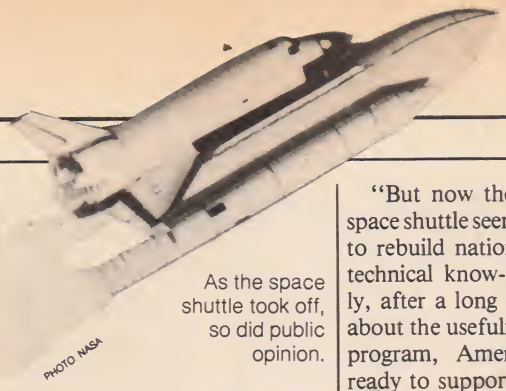

PHOTO NASA

As the space shuttle took off, so did public opinion.

The Harris Survey also reaffirms public support for an overall increase in spending to keep abreast in high technology development. "After a series of perceived major technological setbacks," writes Lou Harris in his survey report, "...there has been a scarcity of good news about American technological prowess.

"But now the success of the space shuttle seems to have begun to rebuild national pride in our technical know-how. Specifically, after a long period of doubt about the usefulness of the space program, Americans are now ready to support U.S. efforts in outer space."

Conducted during a five-day period last May, the Harris Survey polled a national cross section of 1,250 adults. It indicated that the renewed faith in the space program since its slump following the U.S. landing on the Moon in 1969 lies in the opinion that the practical uses of the program are worthwhile. For instance, 82 percent believe it is very important that the space shuttle will allow "experiments with new pharmaceutical products that can help cure disease." And not surprising, considering all the talk of the defense purposes of the shuttle program, 68 percent of those polled feel that the program holds out the prospect of "developing a military capability in space beyond what the Russians are doing."

The pattern of support for spending more federal money on the space program is significant. Republicans want to spend more by 71-26 percent, as do conservatives by 66-30 percent. College-educated Americans favor more spending on the shuttle by 71-21 percent. In contrast, Democrats favor more spending only by 57-39 percent, and liberals by 57-41 percent. Women back the program by a narrow 52-43 percent; blacks oppose the shuttle program by 53-45 percent.

—Bob Woods

IN THE SEA

EXPERIMENTING WITH CRABS

With six spider-like legs, a hard outer shell, and a rigid tail, the horseshoe crab looks like the last thing that doctors would turn to for a medical diagnosis.

But recent experiments have shown that a chemical found in the horseshoe crab's blood, Limulus amebocyte lysate (LAL), has the ability to detect minute traces in human blood of everything from spinal meningitis to bubonic plague.

Unfortunately for medical science, the crabs have thus far refused to mate in the laboratory, and researchers like Fred Pearson, in charge of the LAL program at Travenol Labs in Morton Grove, Illinois, still depend upon nature to produce enough creatures for the precious fluid.

"There's no question about it—we're a berry-picking society. We're at the mercy of the ocean."

Pearson, who gets all of his horseshoes from shrimp trawlers, describes the entire operation, from harvest to LAL extraction, as "fairly simple."

The crabs, after being taken from holding tanks, donate 200 milliliters of their bright-blue blood, and are then returned to the ocean unharmed, where their blood level soon returns to normal. The reasons that the crab blood extract works, however, are more complex.

Pearson says that one of the reasons that crab blood and human blood are able to react together is because the crab blood's bacterial defense system is a forerunner of that of our own. The horseshoe crab's blood protects it against bacteria by producing defense mechanisms, and since the horseshoe must only contend with one type of ocean bacteria—gram-negative bacteria—the defense mechanism its blood produces is highly specialized. In comparison with the crab, humans encounter a greater variety of bacteria, and our blood has accordingly been designed to produce a wider range of defensive mechanisms.

But since gram-negative bacteria are often the cause of human disease (bubonic plague comes from gram-negative bacteria), the single "focus" behavior of the crab's defense system has a remarkable ability to pinpoint diseased human blood—it zeroes in on the trail of disease-causing bacteria.

Doctors are now awaiting the FDA's approval of the extract for use in medical diagnoses, and Pearson believes that because unambiguous measurement of bacteria in the blood is difficult, the tests may take a long time.

—David Fleischer

PHOTO © 1981 LADD COMPANY/WARNER BROS.

Harrison Ford as Rick Decard, about to chase runaway replicants.

FILM

REEL REPLICANTS

Although the recent spate of science fiction films seems to have given way to a slew of slice-'em-up horror spectaculars, there is at least one new SF movie on the horizon (not including the next installment in the *Star Wars* saga, which has become a genre in itself). *Blade Runner*, a motion picture loosely based on Philip K. Dick's classic novel *Do Androids Dream of Electric Sheep?*, will be dashing into theaters this May.

The scene is 40 years in our future, in some unspecified center of urban blight. Earth's cities have become seedy, crime-ridden and altogether not very nice places to visit. Trying to make it in this depressing civilization is bounty hunter Rick Decard (played by Harrison Ford), a retired policeman who now earns his bread tracking down rogue "replicants"—androids who are trying to pass as humans. Co-starring with Ford are Rutger Hauer as his main antagonist, a replicant named Batty, and Sean Young as the mystery woman Rachael.

Blade Runner is being directed by Ridley Scott, who was responsible for the atmospheric SF thriller *ALIEN*. The screenplay is by Hampton Fancher and special effects are being produced by the Entertainment Effects Group.

—Barbara Krasnoff

SPACE SHUTTLE

"COLUMBIA" TAKE TWO

PHOTO & ART: NASA

Astronauts Engle (left) and Truly hope to navigate their used shuttle through a successful five-day voyage this fall.

Joe Engle and Dick Truly have the honor of being the first astronauts to fly a used spaceship. When the space shuttle orbiter *Columbia* lifts off from Cape Canaveral in (tentatively) September it will be the first time a spacecraft has been used more than once. "It was driven by a little old man from Florida," quipped Engle at an April news conference, "and never over 20,000 miles per hour." Designated STS-2 by NASA, the second shuttle mission will further test the *Columbia*'s myriad systems and generally find out if it can do what it was designed to do.

If it is the second space mission for the *Columbia,* STS-2 is the first time in space for commander Joe Engle and his pilot Dick Truly. They are, however, well qualified for the mission. Engle is considered to be the best pilot within the astronaut corps. Engle and Truly have worked together since 1977 when they flew as a team on two of the glide tests of the first shuttle orbiter *Enterprise.*

As opposed to the *Columbia*'s initial 54½- hour flight, STS-2 will be a five-day mission. However, all the tests and experiments are scheduled to be completed by day four. The additional day will give the crew the chance to rerun tests and Earth observations that did not do well the first time around.

During the first five hours of the mission the crew will work on post-launch activities. The *Columbia* will be in a 150-mile-high orbit during this phase of the flight. The crew's major task during this time will be opening the payload bay doors and deploying the radiators. Located on the inside of the payload bay doors, the radiators dump excess heat produced by the orbiter's electrical systems. If the radiators cannot be deployed, or are not functioning properly, the *Columbia* must return to Earth on the fifth orbit—7½ hours into the mission.

The next 88 hours will be spent performing the bulk of the flight activities and experiments. First the crew will fire the Orbital Maneuvering System rockets—an OMS burn to use NASA jargon. The vehicle will be be placed in a "Z axis-local vertical" attitude with the open payload bay facing toward the center of Earth. From this attitude Earth observation studies can be conducted.

The scientific payload is located on the Office of Space and Terrestrial Applications (OSTA) pallet. The Shuttle Imaging Radar A and the Shuttle Multispectral Infrared Radiometer will observe and map geographic formations. The Ocean Color Experiment will map concentrations of phyto-plankton, information useful to the fishing industry. The OSTA pallet also holds various equipment which will chart world-wide concentrations of carbon monoxide—a major component of man-made pollution, survey the occurrence of lightning and develop a system for automatically locating and identifying Earth landmarks from space.

Starting with day two both astronauts will spend part of each day practicing on the Remote Manipulator System (RMS)—the large remotely controlled arm in the payload bay. In later missions the RMS will be used to release and retrieve satellites and payloads while in orbit. On STS-2 the crew will just practice on the system and learn how it works in zero gravity.

Because of the additional test equipment and the scientific payload the *Columbia* will weigh some 10,000 pounds more than it did for STS-1. One of the mission objectives is to see how the added weight will affect the *Columbia*'s launch and landing performance.

The astronauts are not scheduled to venture outside the *Columbia* while it is in orbit. (The only time during OFT flight when an astronaut will have to go outside is if the payload bay doors will not close and latch properly. In such case the pilot, Dick Truly for STS-2, will go into the payload bay and, using a special tool, close the doors manually.) On the third day, however, Truly will don his space suit and climb into the airlock. This is intended to test all the systems and procedures prior to going outside the spacecraft. The airlock will not be evacuated during the test.

During the last eight hours of the mission the crew will finish their preparations for return to Earth. During this time the *Columbia* will not be taken out of its Z axis attitude. Different attitudes may be tried, like tail to sun and top to sun, to determine the thermal qualities of the orbiter.

Reentry for STS-2 will be much the same as for STS-1. The actual landing, however, will be more difficult than on the first flight. When John Young landed the *Columbia* at the dry lake bed at Edwards Air Force Base in April conditions were perfect. Visibility was virtually unlimited and the air was calm. The winds over the lake bed are usually out of the southwest. Instead of landing the *Columbia* into the wind, as most pilots prefer, Joe Engle will try to land the *Columbia* with a cross wind, that is with the wind blowing at right angles to the direction of the landing. This will give NASA additional information about the *Columbia*'s handling capabilities. If there is no wind, or the wind is too strong, a cross wind landing will be postponed until a later mission.

NASA learned many things from the first shuttle mission. However, there are a few changes made to the space shuttle for STS-2. There have been some modifications to the external tank to reduce insulation tile damage from falling ice. The tiles, which were a source of concern prior to STS-1, did their job admirably. The few that fell off or were damaged proved to be of minor concern. Some of the tiles have been strengthened and sensors have been added to some to better understand how the tiles heat up during reentry. Other problems encountered include the space shuttle toilet, which did not perform up to par in STS-1. Clogged filters turned out to be the cause of the problem, so additional filters will be carried aboard the *Columbia* during STS-2. And plastic bags, like the type carried aboard the Apollo capsules, will also be carried on the *Columbia*—just in case.

Though Engle and Truly will be the first to fly a used spaceship, they almost certainly will not be the last. If the first mission was any indication, then the *Columbia* may shuttle some 100 different crews into space during the next few years.

—Bob Nichols

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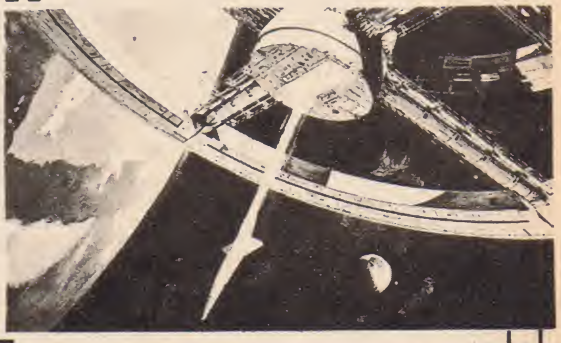

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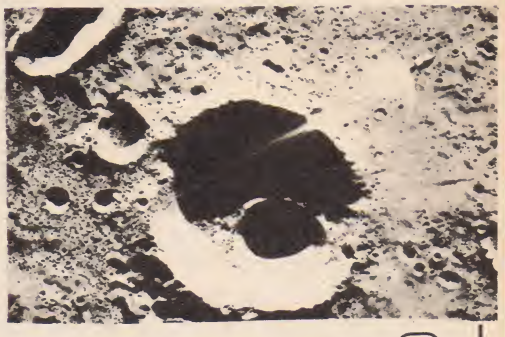

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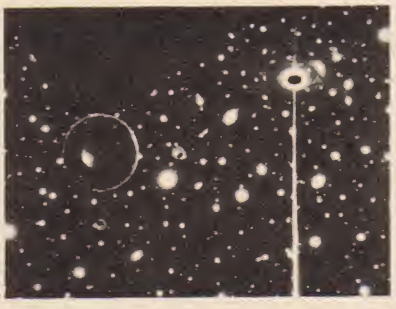

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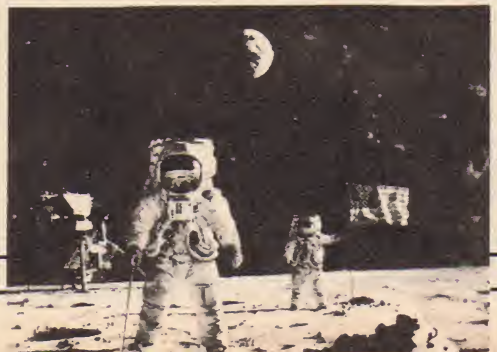

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RUSSIANS IN ORBIT

The Soviet Union is presently developing a permanent, manned orbital space station.

By JAMES OBERG

Soviet space successes on Salyut-6, coincident with extensive delays in the American space shuttle program, have understandably raised a compelling question: Has the United States fallen behind the Soviet Union in a new round of the space race? The string of new Soviet space records—and the apparent lack of any significant American response—has been used by Moscow propagandists to support their latest claims of Soviet space supremacy. Many Western observers, and many ordinary citizens, seem to agree.

But it would be a mistake to view recent space events in simplistic terms or to draw alarmist conclusions from them. The manned space efforts of the United States and the Soviet Union are currently proceeding along parallel paths but are temporarily pursuing different short-range goals, goals which are based on the different needs of the two countries. The rationale for one country's effort would be irrelevant to the other country, and vice versa—so far.

The United States, Canada and the European Space Agency are together developing a "space transportation system," based on the space shuttle, on a family of rocket engines to be carried aloft in and launched from the shuttle and on the Spacelab research module. The immediate goal is to establish easy and economical access from Earth into space and back, and to conduct frequent scientific sorties into orbit with a large variety of scientific instruments and Earth observation equipment. Such capabilities could, toward the end of this decade, lead to the creation of one or more permanently occupied space stations of considerable size.

The Soviet Union, on the other hand, is now developing a small basic space-station module first, in order to gain long-term experience in space operations with a limited amount of research equipment. Later in the decade the Soviets will probably introduce reusable systems akin to the NASA space shuttle, but at present they are relying on tried-and-true expendable boosters and capsules while concentrating their developmental efforts on extending the capabilities of the space-station system itself.

Most experts feel that the United States does not at present need a permanent manned space station, since sophisticated unmanned systems, supplemented by brief but well-equipped Spacelab orbital sorties, can conduct useful work in space—while defining the types of tasks which will eventually justify the creation of a permanent space base. The Soviet Union, in its turn, does not seem to need a cheaper space transportation system, but instead needs to extend the useful space life of vehicles already launched into orbit—and a manned space platform is one logical way to meet that requirement. So both countries are developing space systems based purely on their own internal needs, not in response to some perception of a common goal toward which both nations can race. In that sense, the space race really is over—just as the competition to find ways to exploit space for practical benefits is getting fiercer and fiercer.

The first step in the Soviet plan is the establishment of permanently occupied space outposts orbiting just beyond the atmosphere. The goal has been an officially acknowledged one for years, and is explicitly expressed in a near-religious litany which is repeated after each new Soviet space success (and there have been a lot of them lately): "We believe that continuously inhabited space stations in near-Earth orbits will be humanity's main road out into the universe."

No more breakthroughs are needed. All of the pieces have been tested and verified. Men have proved their adaptability and durability during the long expeditions on Salyut-6; the machines have shown that they, too, can function, as long as men are available to refurbish and repair them. Salyut, Soyuz, Progress—they add up to Kosmograd, the code word for Space Colony Number One, made in the Soviet Union.

The approach to be used in building this Kosmograd has been described in specific terms by numerous Soviet spokesmen. The basic theory was expounded several years ago by Boris Petrov, chairman of the Interkosmos Council for scientific space research: "When it comes to creating large stations, it will obviously be expedient to carry out their assembly from component parts in one or two dockings." Sergey Grishin, a leading official of the Soviet flight-control center, told reporters in mid-1979 that such a course had been chosen: "Orbiting stations of future generations will consist of separate, independently launched modules. The main module will offer more comfortable conditions for crews; it will have control consoles for all the orbiting station's systems. Other modules, which may fly detached from the main module, will contain scientific apparatus and technological equipment that require special orientation of the modules

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ART: ANDREI SOKOLOV

and total absence of vibration and gravity forces." Salyut designer and former cosmonaut Konstantin Feokistov wrote in mid-1978 that "as in the Salyut-6 station, one can envision replaceable modules docking with a space factory or orbiting laboratory to supply new or improved equipment." The unanimity of these descriptions betokens the official blessing which this approach must have received.

The intended use of such equipment is not mysterious, explained chief cosmonaut Vladimir Shatalov in late 1979: "We are close to the constant operation of orbital stations—to around-the-clock, year-round work of cosmonauts aboard them, replacement of crews directly aboard the stations and regular delivery of the necessary materials into orbit." Nor is it any secret how long the space-duty tour should last: chief rocket designer Valentin Glushko told an *Izvestia* reporter recently that it would seem "reasonable" to have crews work in space for as long as one year. In this regard, Glushko pointed to the experience of 24 Arctic and 23 Antarctic expeditions which had changed crews annually. Chief Soviet space doctor Oleg Gazenko endorsed this view in March 1980 when he told a Hungarian newspaper that flights lasting a whole year "could realistically be envisaged for the near future."

So the development of a permanent Soviet space station is entirely feasible in the 1980-1982 time period. Three or four men could work aboard it in orbit for a year at a time. Periodically, new Soyuz replacement vehicles would be brought up by visitors, who would include guest cosmonauts as well as Russian scientist-cosmonauts. Add-on modules would provide temporary specialized labs. The core Salyut module could be operational for at least five years.

And, of course, such a station will be only the first step in the spaceward migration prophesied by Tsiolkovskiy.

A key element in setting up large permanent space colonies and in preparing years-long manned expeditions to other planets is a system for recycling air, water and some food. Such a "closed-loop" life-support system could use a combination of mechanical, chemical and biological processes to grossly reduce the amount of fresh supplies needed to keep space-farers alive.

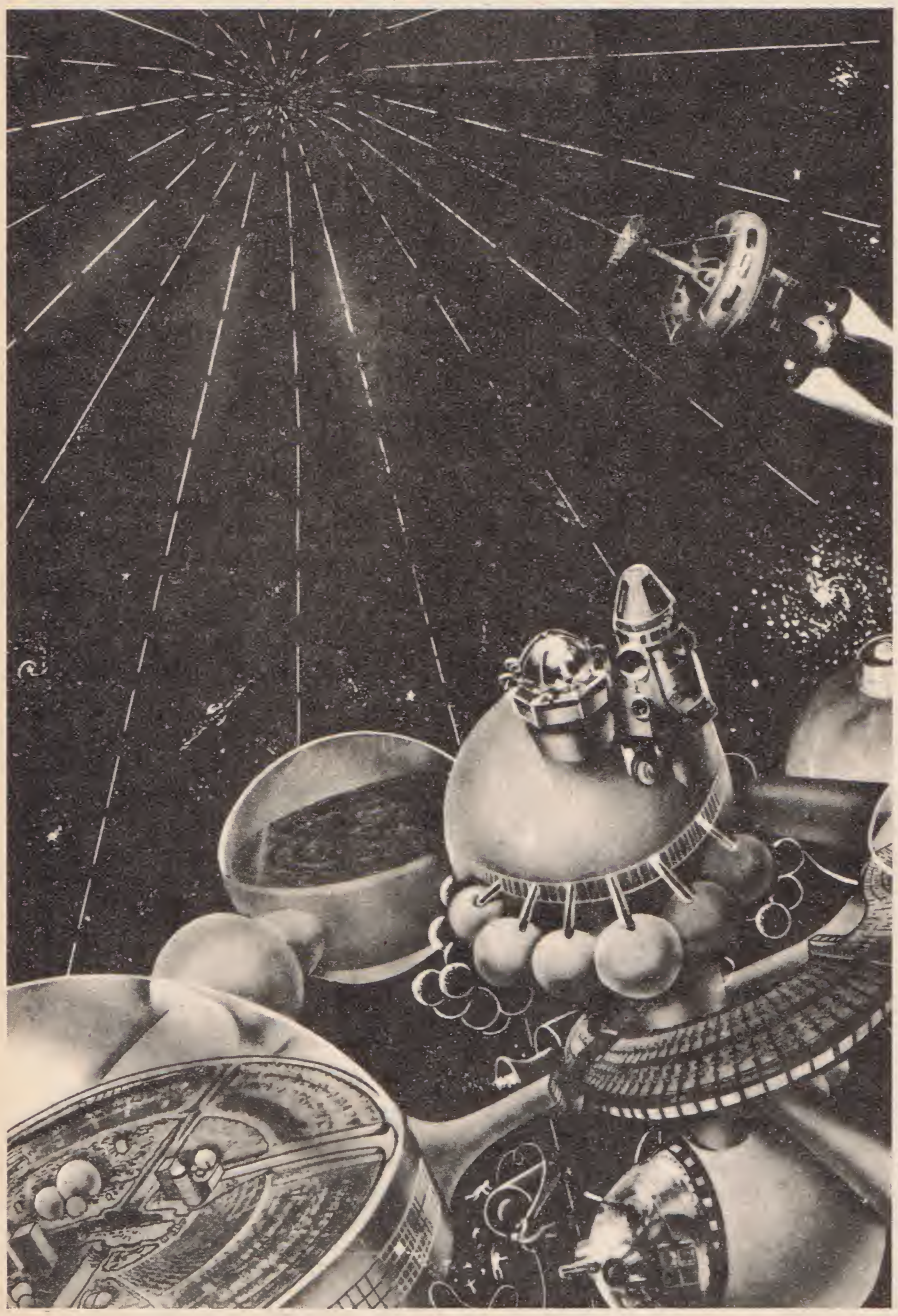
Water on Salyut-6 was already 50 percent recycled via a mechanical system which extracted humidity from the cabin air. The next step is a urine still, which could increase reusability to 90 percent or better. Such equipment is doubtlessly in an advanced stage of development.

Air on Salyut-6 was purified via chemical reactions with various substances, but this required chemical canisters of great bulk and weight. Banks of chlorella algae have already been tested in space—they could help absorb carbon dioxide and give off fresh oxygen, achieving a recycling of better than 80 percent.

Food on Salyut-6 was imported in canned or dehydrated form. Space gardens have produced some edible plants, first as a novelty but later as a significant dietary supplement (primarily for vitamins). Space gardens of the near future will be able to produce fruits and vegetables to the extent that 20 to 40 percent of the bulk food consumed in orbit will be grown in orbit.

This area of research is one which has already been vigorously pursued by Soviet engineers, both in space and in Earthbound laboratories. The payoff is so promising that continued efforts—and continued progress—can be counted on. But it is not an easy line of research, as experience on Salyut-6 has shown: scientists are still trying to determine why it has been impossible to produce a complete plant-development cycle on board a spacecraft and why plants grown from seeds have failed to bloom or to produce seeds of their own.

Other studies have been more productive. Chlorella experiments have shown that these algae cells grow much faster in space, although they exhibit a different cell morphology whose significance is not understood. In any case, scientists



ART COURTESY JAMES OBERG

Soviet space art envisions a future space colony complex.

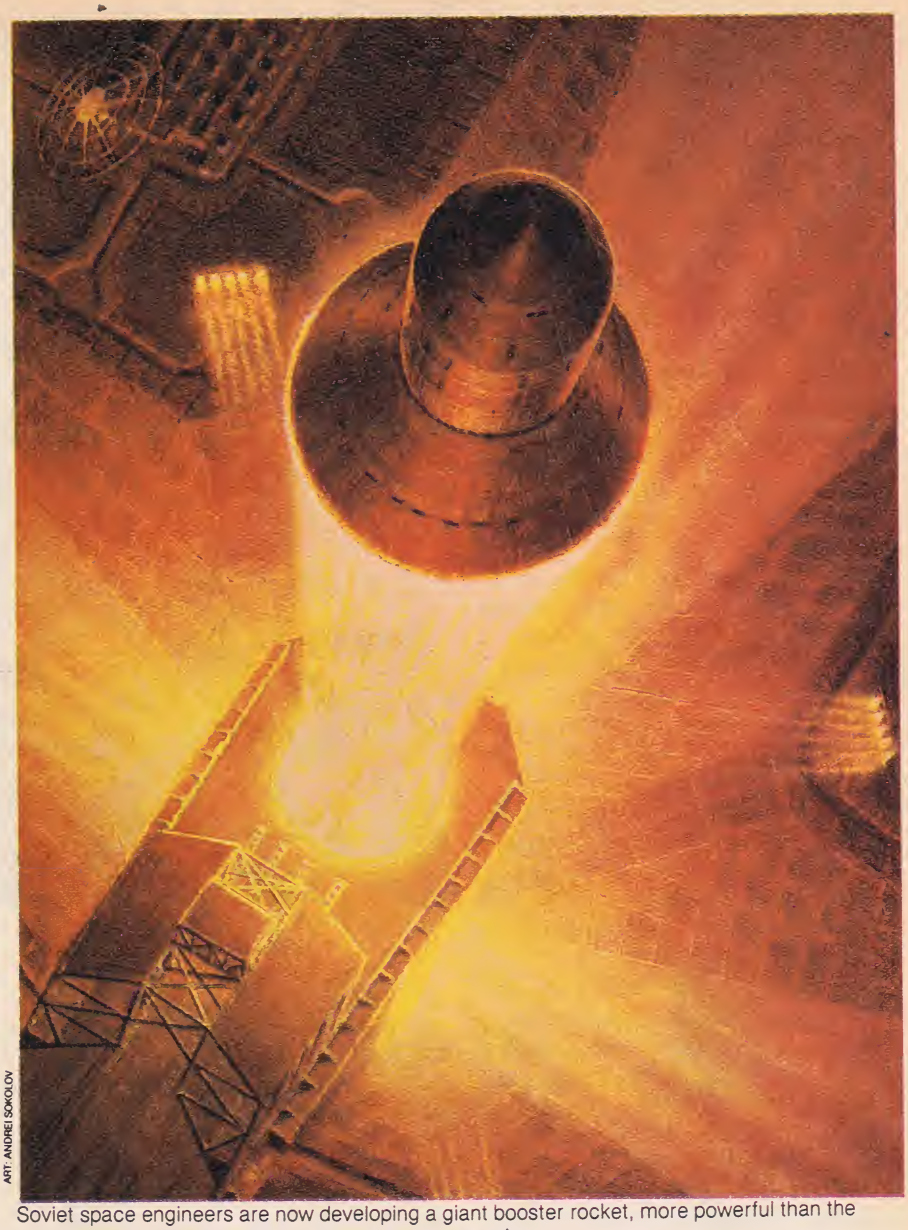
have calculated that a tank with 10 to 15 gallons of chlorella in suspension would be sufficient to resupply one crewman with adequate air, protein and fresh water. As for food crops, Soviet botanists are investigating both traditional plants (wheat, cucumbers, cabbage) and unusual ones (flax, chrysanthemums, wild onions). Different methods of providing nutrients to the plants are also under investigation, including hydroponics, "aeroponics," capillary systems and aerosol methods. The only way to advance in this technology is to experiment in flight, and that is exactly what the Soviets are doing.

Throughout the 1980s, Soviet space stations will grow in size beyond the intermediate ones holding two to six crewmen. Boris Petrov wrote in 1977 that "scientists are already busy designing larger stations, for a crew of 12 to 20, with a lifespan of up to 10 years, which would replace the present small stations. This will happen as soon as it is clear that the present stations have exhausted all their possibilities." Space experts are even predicting the appearance of "space towns" with several thousand people, perhaps by the end of the century. Konstantin Feokistov reported that conditions there would not just be acceptable, but even be "very attractive."

Although the Soviets stopped talking about sending cosmonauts to the Moon back in 1969, when Apollo 2 landed and the Soviet effort failed, recent statements from space officials suggest that new man-to-the-Moon plans have been made.

For example, space official Georgiy Narimanov gave the following account to a newspaper reporter in 1979: "I think that stations designed for lunar studies will figure prominently in future space exploration. With such stations put into lunar orbit, it will be feasible to periodically take cosmonauts to the lunar surface aboard small expeditionary ships. Such stations will be assembled in Earth orbit and then sent to the Moon." Dr. Boris Petrov, head of the Interkosmos Council for international space cooperation until his recent death, has frequently echoed Narimanov's words: "In the future, there will be a need for a lunar orbital station, which could be assembled in near-Earth orbit and then towed into lunar orbit."

Given the kinds of space capabilities which are being developed for Earth-orbital operations in the 1980s, a Soviet manned lunar program looks more and more feasible. Soviet manned lunar flight could progress over several plateaus, each more difficult—and rewarding—than the last. A fully fueled Soyuz with beefed-up heat shield could link up in orbit with a Proton-launched rocket unit, which would push the complex out to the Moon. There, the Soyuz could maneuver into an orbit around the Moon for a month-long scientific survey.



ART: ANDREI SOKOLOV

Soviet space engineers are now developing a giant booster rocket, more powerful than the U.S. Saturn 5 launch vehicle, for future space operations.

Permanent space stations could be set up in lunar orbit. This would require a specialized Salyut module, a Proton-launched rocket unit and a third Proton launch carrying additional propellant for the rocket unit. Once the Salyut reached lunar orbit, cosmonauts could be sent to it on board stripped-down Soyuz capsules launched aboard single uprated Proton boosters.

Other Proton launches could each emplace two or three tons of supplies directly on the lunar surface. With such equipment caches already set up, cosmonauts could descend from the semi-permanent lunar-orbit space station on board minimum-weight "space scooters" —perhaps even just sitting on an open rocket platform in spacesuits. Soviet cosmonauts would then have reached the Moon via a series of steps that insured continuous (even permanent) manned activity around the Moon.

Flights to Mars and other planets have also been the topic of official speculation, and while no timetables are given, the impression is that such feats are possible before the end of this century. Soviet space experts have made repeated assertions that their long-term space stations are paving the way for interplanetary flight.

For example, at the beginning of the Salyut-6 mission, cosmonaut Georgiy Beregovoy wrote that such long-duration space stations were important for many reasons: "Their successful devel-

opment is creating the necessary conditions for interplanetary flights." Cosmonaut Grechko put it in a broader perspective in late 1978 when he wrote that "in less than 20 years the duration of space flight has increased from little more than an hour to many months. This progress will continue, and soon we will be able to stay in space for two or three years. Specialists would not be surprised if men land on Mars [in the next 20 years]."

Late in 1979 cosmonauts Georgiy Beregovoy and Valeriy Ryumin told Soviet radio listeners that manned Mars missions could begin in 10 or 15 years. A year later, after returning from his second six-month space flight in a row, the 41-year-old Ryumin announced his readiness to go up again: "If an expedition to Mars were being prepared and it should be necessary to hold a year-long stay in space as an intermediate step, I think that we would readily agree to such work." Chief Soviet space doctor Oleg Gazenko told European scientists the same thing in November of 1980: "It is difficult to give an exact date for a flight to Mars. But I think the basic prerequisite for such a flight exists now... Whether the flight happens in 10, 15 or 20 years, I cannot say. But I believe it will be before the year 2000."

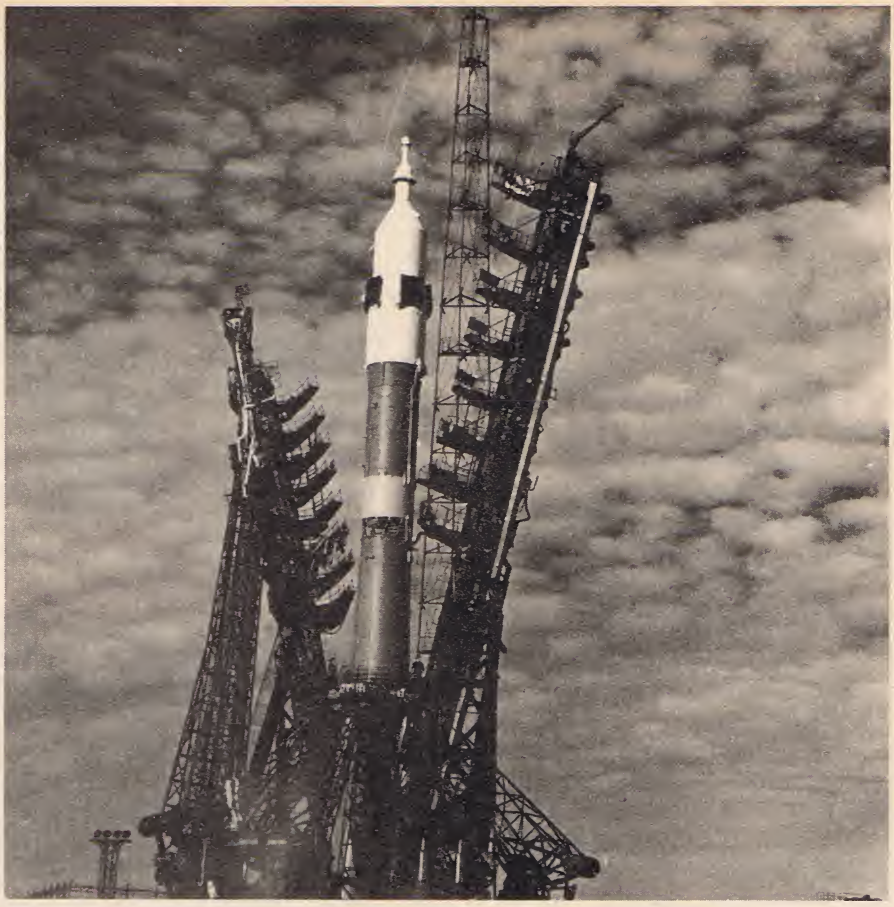


PHOTO NASA

View of a launch pad in Kazakhstan showing a Soyuz craft and its launch vehicle.

Such flamboyant forecasts are solidly based in good, sound engineering logic. Salyut is just the kind of module needed for a two- or three-year-long round trip to Mars in the mid-1990s. Current and near-future orbital operations are generating precisely the kinds of test data needed to design manned interplanetary spacecraft. In fact, the kinds of equipment which will be installed on permanent space stations will not differ significantly from the kinds of equipment needed for a Mars expedition. The life support (with most water, air and food recycled), the crew systems, the communication systems, the navigation computers—all will be ready, after having been used operationally on orbital space flight for years.

So to the question "Do the Soviets plan to send men to the Moon and planets?" the answer is clear: while such flights are several years away, the Soviets today are testing equipment which would be needed to support such flights. Frequently such equipment and techniques are more sophisticated than those that would be needed merely for Earth orbital operations. Soviet pronouncements on such distant goals, then, are more than just daydreams: cosmonauts and space engineers are doing their homework now to allow those dreams to be realized.

Important new information on Soviet manned space plans was revealed by *Aviation Week* magazine in mid-1980 when its space editor, Craig Covault, published what appeared to be an account of a high-level briefing from U.S. intelligence agency officials. "Soviets Developing 12-Man Space Station," was the title of the article; the lead paragraph summed it up: "Soviet Union is developing a 222,000-lb. military/scientific space station to be manned permanently in Earth orbit by about 12 cosmonauts following launch in the mid-1980s on board a 10-14 million-lb. booster more powerful than the U.S. Saturn 5." Covault continued with the prediction that "the massive new booster and space station will provide the U.S.S.R. with a solid base on which to mount the first manned missions to Mars in addition to initial Soviet manned lunar flights."

The news that the Soviets have re-

PHOTO NOVOSTI

Cosmonauts aboard the first manned flight of the new Soyuz-T in mid-1980.

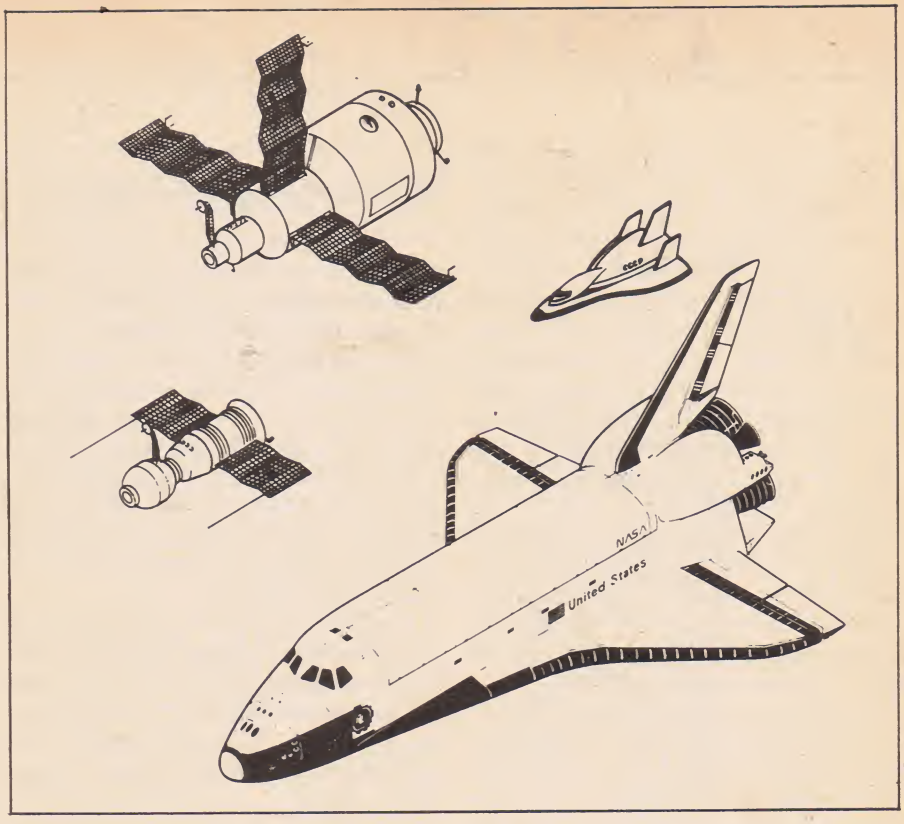
sumed development of their superbooster (which was a dismal flop in the 1969-1972 period) is confirmation of a claim from Europe last year. There, former German rocket expert Rolf Engel, writing in his book, *Moscau militarisiert der Weltraum (Moscow Militarizes Space)*, alleged that his own East European contacts had informed him that the big booster was being reconsidered and that the launch pads were being overhauled.

Aviation Week suggested that the first launch could come as early as 1983 and that the booster could be operational by 1985. Its payload capacity would be about as much as the Saturn-5 (its higher thrust would be offset by less efficient engines); more than 200,000 pounds in low Earth orbit; about 100,000 pounds to the Moon; a bit more than that in geosynchronous orbit and a bit less than that on an interplanetary trajectory.

By the time the heavy space station is to be launched, *Aviation Week* suggests that a winged "space shuttle" (launched on an expendable Proton booster) would also be available to transport crew and cargo to the station. New systems to support Soviet cosmonauts on the Moon would have to appear a few years later.

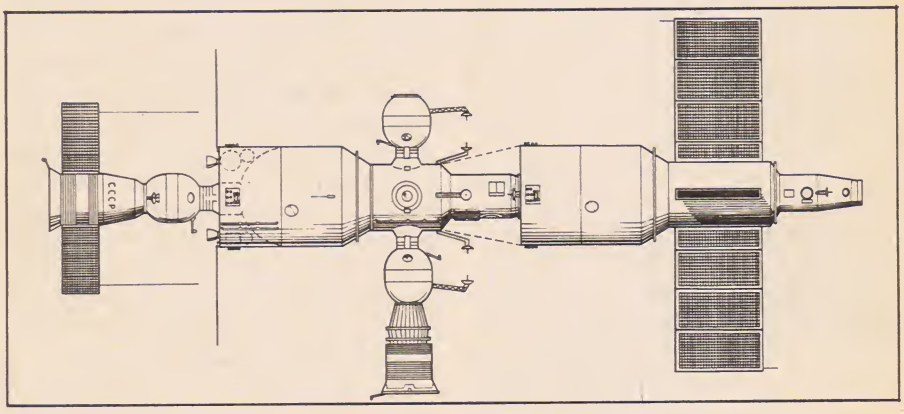
Covault's article did not avoid making some value judgments which bordered on editorializing: "Explosive expansion of Soviet space program activity over the past several years, especially in the manned area, has been possible because the Russians have been providing their program with real funding increases of 3-5 percent per year, a sharp contrast to the U.S. congressional and presidential attitude toward the U.S. program since the end of the Apollo project. . . . These new Russian developments of expanding booster power with a Saturn-5 class vehicle, development of a permanent space station larger than Skylab and planned use of winged, reusable space transports indicate that the decades the 1980s and 1990s will be full of intense Russian manned space activity. Many managers in the U.S. space program hope the military strategic and scientific significance of this major Russian development push will not be lost in planning for the space shuttle and will stimulate full use of its capabilities."

The aerospace magazine closed the article with a quotation from a presidential briefing prepared by the National Security Council in late 1979: "The currently operational military and civil Soviet manned program could provide them with significant scientific, technical, political and strategic advances. . . If we do not expend the thought, the effort and the money required, then another more progressive nation will."



ART © 1981 PAT RAWLINGS

Above: The U.S. space shuttle is far larger than Soviet craft. Shown here (clockwise) are the Salyut-6, Soyuz-T and a design concept for the Dyna-soar, a shuttle-type vehicle. The U.S. shuttle's payload bay is large enough to carry a full Salyut space station. Below: Artist's concept of a double Salyut space station.



Soviet space vehicles will be flying in great numbers over the next several years. Their current launch rate of 100 satellites a year (compared to the United States rate of 20) will doubtlessly continue, but such numbers—and the different types which they break down into—will be of interest mainly only to statisticians. For the Western public, these Soviet space shots are both invisible (they aren't newsworthy enough) and uninteresting (what news is printed consists of dry facts without any context or analysis).

Furthermore, there's little reason to expect the quality of American news-media coverage of Soviet space activities to improve much, either. For weeks in 1978, Western correspondents in Moscow kept repeating how wonderful it was that the Progress-I robot tanker had transferred "liquid oxygen and kerosene" onto the Salyut-6 space station; but it hadn't (the fuels were nitrogen tetroxide and hydrazine), and no Russian source had ever said it had. Later in 1978 a leading New York newspaper science editor described how the dying Skylab space station might soon be followed to a fiery doom by the "empty derelict Salyut-6"; the description would have startled the two cosmonauts who had been happily working on board the station for weeks, unknown to to the science editor. When Salyut-6 cos-

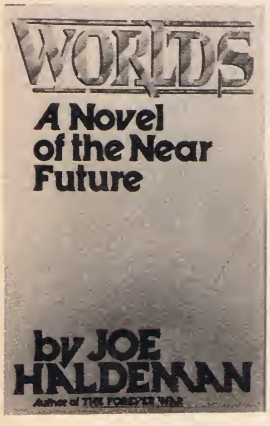
(continued on page 52)

Apocalypse How?

Warning!

Welcome to the new improved Cold War! If you've been following the saber-rattling exploits of our (and other) nation's leaders, you may be feeling a certain nostalgia for your grandmother's root cellar or a quiet yen for a piece of truly remote real estate—say the farthest reaches of British Colombia. And, as speculation about winnable holocausts continues unabated in Washington's five-sided asylum, SF's writers have shown their usual prescience—there's been a spate of appropriately grim end-of-the-world-as-we-know-it novels.

In this dread harvest, Joe Haldeman's **World's** ($12.95 in hardcover from The Viking Press) comes off as positively optimistic. Haldeman thinks that we may almost make it to the 22nd century before we get around to toasting the planet. On top of that, he even posits a healthy group of survivors.



Haldeman's survivors are the people of the "Worlds"—the orbital home of humanity's first half-million extra-terrestrials. These Worlds are hollowed-out asteroids that have been homesteaded to provide Earth with the metals and energy that it so deperately needs to offset the perils of overpopulation and diminishing resources. The only problem is that Earth and the Worlds are so far into crisis mode here that no one can imagine how calamitous things could become.

This is a sprawling action novel and Haldeman performs admirably, moving us and his characters throughout the Worlds and around planet Earth while avoiding most of the boring travelogues that peripatetic excursions of this sort are heir to.

We see this panorama through the eyes of Marianne O'Hara, citizen of New New York, the largest of the orbital communities. Ms. O'Hara has been dispatched to old New York to put the finishing touches on her education and almost ends up finished herself.

O'Hara naively manages to get herself in the middle of a three-way confrontation between the Lobbies (who are by this time the United States' legal government), the Third Revolution (which has its own ideas about who should run things) and the Worlds (who are tired of taxation without representation—among other things).

Though O'Hara's involvement is simple enough—she just dropped in for a look at the revolution—the results of her presence in the Third Revolution's plottings are anything but simple. In a way she's the straw that breaks Mother Earth's back.

Ms. O'Hara actually manages to be romantically involved with all sides—she marries an FBI agent, falls in love with a poet-revolutionary and has another fellow on ice in orbit. And she's just as active as she is involved.

The action, though, is simultaneously the story's greatest strength and major weakness. The book is wound up so tight that you never cease to be excited, but at the same time you're held at an awkward distance from the characters. You never get involved enough with any of them except O'Hara (and O'Hara's not all that likeable) to care whether they're there or not. So when the Earth goes up in smoke, you couldn't care less.

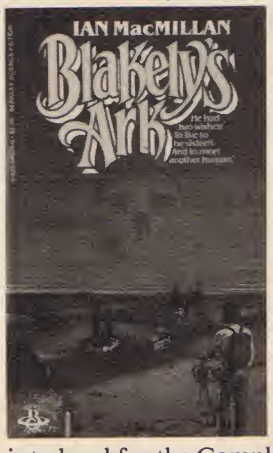
Worlds is exciting, well-written and more than a little heartless. It would probably make a terrific movie; it will probably have a superb sequel—but aren't books written to stand on their own merits anymore?

The End Is Near

Ian Macmillan takes a shot at the heart of the matter with his apocalyptic offering, **Blakely's Ark** ($2.25 in paperback from Berkley). Here, one watches a boy struggle to become a man in the most chilling circumstances possible.

The action takes place in an indeterminate and not-too-distant future. The world of tomorrow has been almost completely emptied by ceph, an absolutely fatal disease. It may be something that escaped from someone's lab or it may just be that we humans have worn out our welcome; whatever it is, ceph kills every warm-blooded creature that gets it and almost every one does. This is a world with no birds, no bears and only one of every 30 humans is left.

Dave Hunter is one of the survivors. He's 15 and he's never even had a cold. His father was the same way until the day he slipped up. He let a stranger get too close and traded his life for a handshake. Dave doesn't remember the last time he let anyone closer than the six yards his dad told him was a safe distance.



Now, Dave's going to get to test all the lessons his father taught him. The only other family in Buffalo won't let him near since he might have ceph, so his only choice is to head for the Complex. By the time he gets there he'll either be dying or know he doesn't have it.

The Complex is the last city in America. It is a huge sterile dome that covers what was once Manhattan and Brooklyn. It holds the last few million survivors and is supposed to be the only real refuge against the ceph. Dave thinks that the trip should be easy and once he reaches the city, everything will be just fine—he has his birth certificate and his ticket in, so what does he have to worry about?

It turns out that there's a lot to worry about. The Complex is surrounded by concentric rings of scavengers, thugs, druggies and the hopeful. You can earn your way into the city and there are a lot of people waiting for that. There are also a certain number of people stuck outside because of red tape—this is the last bureaucracy in America.

Dave is a freak to these people. There's not supposed to be anyone or even anything alive out where he rode in from. And now this boy is telling them that all he had to do was eat right, think right and keep his distance to survive—something that the city in a can is

not doing very well, at the moment.

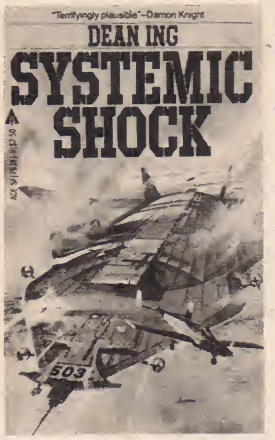
Dave arrives at the height of summer. The bug likes the heat and so there's a ceph outbreak going on—and there's always a chopper spraying gas somewhere to help the dying get dead. It doesn't take Dave long to see that these people haven't gathered here to live—they're just waiting to die. He decides otherwise.

This is a moving story about positive values in the faces of the direst circumstances. It talks about decisions that have to be made and then shows how most people avoid even being aware of them, much less getting around to making up their minds.

This is really the bleakest of these three holocausts—with 95 percent of the planet dead, what else can it be?—but it's the only one that ends on a truly human and hopeful note. There are bathetic touches here and there, but MacMillan has faced some of the emotions that come along with growth and disaster. MacMillan went for feelings instead of fireworks and came up with something fine.

Nearer

Dean Ing, on the other hand, seems to love fireworks. His latest effort, **Systemic Shock** ($2.50 in paperback from Ace Books) is the most pessimistic of these three epics—he puts the date for doomsday a scant 15 years from today and includes all the latest and greatest disaster scenarios from all over.



Ing's world starts where General Sir John Hackett's *The Third World War* leaves off—there's already been one superpower nuclear faceoff in 1985 with a loss of two cities and a breakup of the Soviet Union into the Russian Union of Soviets, a loose group of Iron Curtain countries that really has nothing like the power it used to. Now it's a decade later, the R.U.S., the U.S.A. and the old standby allies are taking on a new alignment and the SinoInds—China, the Arabs and much of Africa—are lined up and ready to remake the old order. Of course, oil is the fire starter.

Almost half of the U.S. goes up in the first days of the war—atomic bombs are almost the least of the survivors' worries. Bacteriological warfare seems to be everybody's wave of the future nowadays.

The key survivor in this survivalist saga is 14-year-old Ted Quantrill, a boy who does a high-speed maturation number that's purely in the Duke Wayne tradition. On the day the bombs fall, Ted discovers that might does make right if you're talking about the right strategy for applying a strong right arm. He then proceeds in short order to rescue a damsel in distress, get laid, kill his first two men, rescue a dirigible, join the army and get recruited as a government enforcer/assassin.

Definitely not the way Beaver Cleaver would have handled the end of the world, right? Actually, Ted (and characters in general) are less in the story than that catalog of adventures might lead you to think. Evidently, someone told Ing that to have a saga you have to have a complex plot with lots of disparate threads that give the reader a better picture of the whole scene. Ing has gathered together lots of threads but he never manages to get them to come together.

Instead, the book reads like a catalog of all the latest weapons fantasies (particularly things biological), international intrigues, survivalist sayings (you never knew there were so many ways to say *be prepared*)—in short, everything but a story with character development, compelling plot line or anything resembling a satisfactory resolution.

This book would be terrific for setting up a game for WWIII—Mr. Ing's been reading all the right books about fast, slow and nasty deaths and he's got the gadgets down—but he doesn't really have anything to say about what it costs to be a survivor or how real people will live after the ball drops.

The End Is History

If Mr. Ing wants to see how to put together a proper saga, he could do a lot worse than checking out M.K. Wren's **The Phoenix Legacy** ($2.75 per volume in paperback from Berkley). This epic trilogy is only two-thirds finished, but because of its pulpy predictability, you don't need all three to report that these books manage to be supremely entertaining. They are great beach, bus or "I want to get away from it all" books.

The heroic alignments here are simple. As is usual with sagas, the books are family-oriented. The Woolf family's tall, dark and dynamic men are the good guys. The pale, twisted men of the Selasis family are the villains. The outsiders (always a necessity in these things) are the people of the Phoenix—an underground that is battling the ultra-conservative oppression of the Elite.

This is the 32nd century. The world fell apart early in the 21st—in a spasm (now familiar) of bombs and increasingly horrible and devasting disease. The planet was devastated and a dark age followed. What arose from the ashes was a new sort of technological feudalism. Wren gives us a feel for the logic of this world in a series of short sociological/historical treatises tucked in among the adventures.

There are three classes and no illusions about equality among them. The Elite are the top dogs. Each of the Elite families controls an industry, an important patent, a specific service or a planet's resources. Humankind has once again reached the stars, but now the Elite have stopped exploring. Below the Elite are the Fesh—a middle class controlled but not entirely owned by the Elite. Below them sit the Bonds who are deliberately uneducated slaves who exist entirely at the whim of the Elite.

The story is straightforward. The

(continued on page 57)

By CAROLYN MEINEL HENSON

Lightcraft

UFOs are *the* taboo subject among space researchers. It's not that our minds are closed—okay, I'll admit that we may have our prejudices. But there are plenty of factors that scare even the most rational minds away from this field.

Embarrassment, for example. In 1962, Tucson meteorologist Dr. James McDonald got a grant to study UFOs. That summer turned out to be a vintage year for mysterious activities in the sky. Strange red and green lights floated over Tucson nearly every night. Sometimes they would disappear with a bang; one clear night they burst into leaping flames. Dozens of alarmed Tucsonians called the police, reporting everything from airplane crashes to Armageddon. A spokesman for the local Davis-Monthan Air Force Base blandly assured reporters that the "flames" were neon lights reflecting off the night's nonexistent clouds, fueling rumors of a military coverup job.

Eventually a motorist driving down Speedway (remember, according to *Life* magazine it's the ugliest street in the country) spotted a bunch of college students in a vacant lot launching a hundred-foot triangular natural-gas balloon hung with red and green Japanese lanterns. He called the cops, who herded the pranksters in to see McDonald. Under grilling, these lads (one of whom, Keith Henson, married me five years later) admitted to perpetrating all that summer's excitement.

True, Dr. McDonald did a bangup job of researching unidentified flying objects. He even caught the guys who were trying to make a sucker out of him. But no one wins the Nobel Prize for nabbing college pranksters or even gets a research grant renewed, as McDonald learned.

Even the most open-minded of us are, well, let us say ill at ease with even the thought of flying saucers. As a result I was a little taken aback when, at a Washington dinner party last April, three laser researchers unveiled to me the spaceship of the year 2000...one that will cost about the same, in inflation-adjusted dollars, as a Learjet...one that will carry tens of thousands of people into space as routinely as New Yorkers fly to Hong Kong. It looks like a flying saucer.

This frisbee-shaped ship of the future is the brainchild of Dr. Leik Myrabo of the BDM think tank. Leik (pronounced "lake") has plenty of practical design experience, having built such diverse things as a 300-horsepower custom sports car, a solar-powered house (which he shares with his wife and two kids) and kinetic light sculptures. He developed his shuttle concept in 1976 at the University of California (San Diego) shortly before receiving his Ph.D. in engineering physics, specializing in gasdynamics and propulsion. Two years later, he developed propulsion concepts for an Earth-to-orbit space truck which can best be described as a "supersonic blimp."

Leik's space shuttle would look like the standard science fiction movie prop, with the addition of twelve synthetic sapphire windows on top which let in the laser power. Passengers would enter from below. The pilot would signal for a laser beam from a solar power satellite above. *Zap*! The "lightcraft," as Leik calls it, would leap from the launch pad with a soprano scream—a sharp B natural above the treble cleff, to be exact—at 30 gees.

Thirty gees? Gulp. "You try it first," I told Leik.

"Hey, no, 30 gees is easy," assured this guy who needs 300 HP under the hood of his car.

"I've seen those pictures of the guy who did 20 gees on a rocket sled. His face was one big bruise."

"That's because he took the gee forces a long time. The lightship will only pull 30 gees for an instant to get up to sonic speeds where the MHD (magnetohydrodynamic) fanjets cut in."

How would the laser power the lightcraft? For starters, the laser beam is a million times more intense than noonday sunshine. Only synthetic sapphire or diamond would be clear and heat-resistant enough to let in such a powerful beam.

Inside the engines the laser light is focused to 10,000 times greater intensity: one billion watts per square centimeter. At this power level ordinary air explodes with a force greater than burning rocket fuel. This is what drives the lightcraft.

When air starts to get thin the lightcraft can continue to accelerate by valving in anything from hydrogen to liquified air to even water from storage tanks on board. This propulsion mode continues into the vacuum of space.

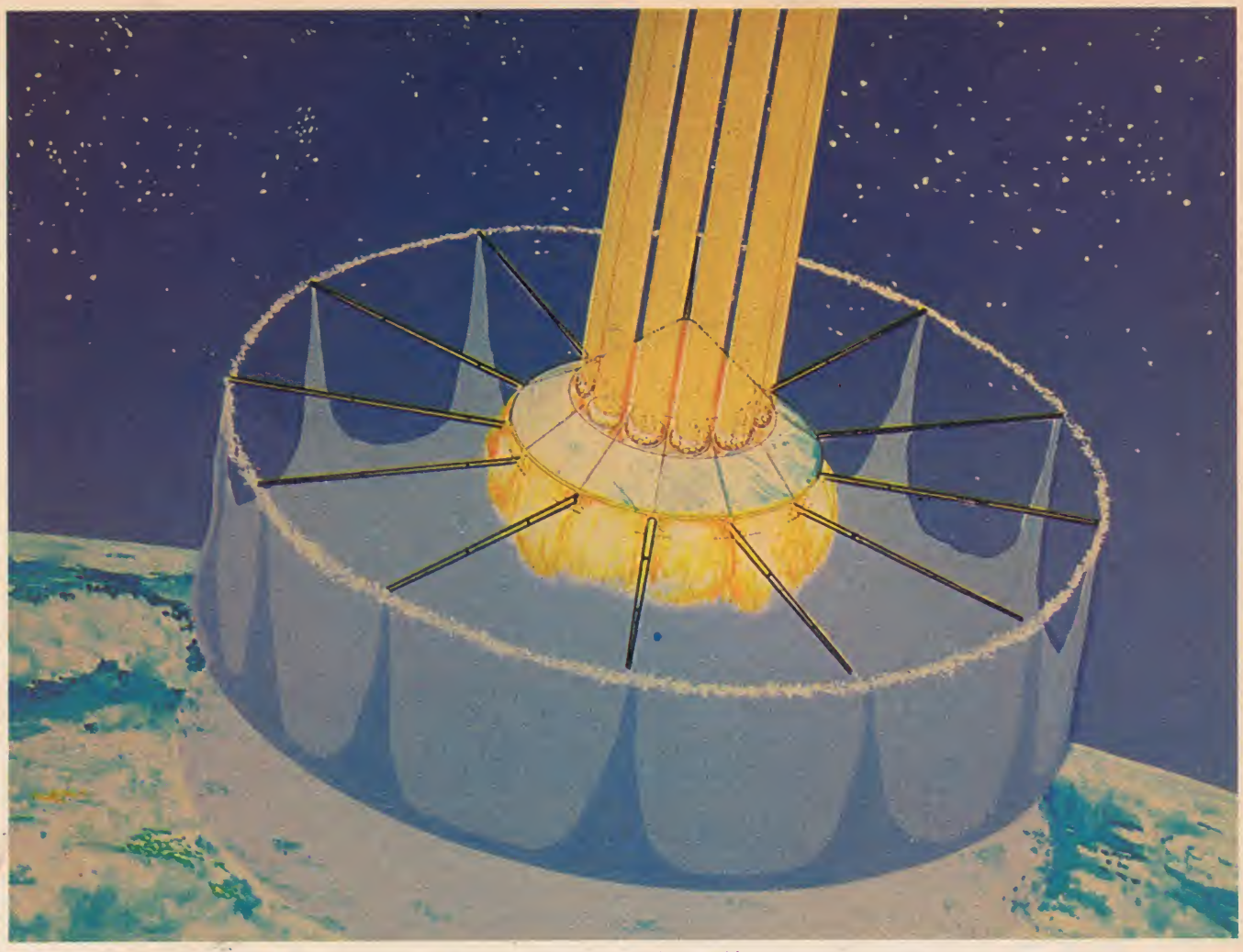
If you think that's something, try on Leik Myrabo's "supersonic blimp," as he calls it, for size. I thought Keith's 100-foot-long UFO hoaxes were something. But imagine a space truck that looks like the Goodyear blimp, only more than 16 times as long—that's one kilometer from tip to tip. It would lift off in boringly conventional fashion, floating up sedately like your garden variety blimp. But when the pilot calls down the laser beam the vehicle speeds up with the roar of a volcano, trailing lightning bolts in its wake.

What happens is the laser beams, as in the frisbee-style lightcraft, detonate air with such force that it becomes an electrically conductive plasma. This is run through a magnetic field to generate electricity. The electricity is used to expel relativistic electrons at one end of the blimp and positive ions at the other. These clouds of charged particles electromagnetically connect the vehicle to the atmosphere and therefore propel the blimp upward. Funny side effect: those positive and negative charges want to get back together again, just like those opposite charges that get swept apart in the drafts of a thunderstorm. They ought to give us a pretty good lightning display.

This blimp will also be able to accelerate in space, using valved gas or water to keep its laser engines fed. What a way to deliver ham sandwiches and the latest issues of *Playboy* to space construction workers!

What's really important to me, though, is how much it would cost me to ride one of these ships. I want to *go*. Why do Leik and the other laser researchers predict that laser spacecraft will give us the low-cost freedom to leave the planet 20 years from now?

First, there are few moving parts—few things to break or slip out of adjustment. Second, the lightcraft carries little propellant. The space shuttle, for example, uses most of its power simply to lift its own fuel supply. But a lightcraft, even when running on liquified gas or



ART © 1981 RONALD CARTER & RAYMOND RUE

Dr. Leik Myrabo's MHD-fanjet space shuttle will be powered by laser energy beamed from above.

water in the vacuum of space, uses the laser beams to heat it to temperatures beyond the hottest rocket exhaust, getting more thrust per kilogram of propellant. Third, lightcraft could be assembly-line produced. That's the trick that turned the automobile from a rich man's toy into the Model T and put America in the driver's seat.

Alas, Leik's shuttle won't quite qualify as the Model T of space. "However," he promises, "its cost should be comparable to that of a Learjet."

Not exactly everyone can afford a Learjet today. To buy the Model 35-A, which carries a crew of two plus eight passengers, you'd have to dip into your savings account to the tune of $3.5 million. A reasonable new car, by comparison, sets you back $10,000.

So, to get a rough idea of what it would take to buy a spaceship in the year 2000, 350 people would have to each pitch in the price of a new car. But that's not really so bad. Unlike the space shuttle, lightcraft won't need fancy tuneups or tile repair between trips, so they could make daily flights. At a standard Learjet load of 10, the 350 co-owners of a lightcraft could each take a flight into space nearly every month.

But what would the laser power bill come to per trip? You think your monthly light bill is something—how about lighting up the explosion chamber of your ship with a laser beam having a million times the power of an ordinary lightbulb?

Dr. Arthur Kantrowitz, who first thought up the laser rocket concept, calculated that a lightship would need only 4.5 kilowatt hours of power (per pound of payload) to reach a 185 km orbit. That's 45 ordinary lightbulbs (100 watt) running for one hour. In Tucson that would cost me 25¢.

Unfortunately, this is a calculation of ideal efficiency. The first lightships will be relatively clumsy—new to the business. Leik suggests we figure on burning 40 to 90 kwh per pound to reach orbit. That's a more hefty $2 to $4.50 per pound.

How much would a ten-passenger spaceship weigh? Commercial airplanes typically, at takeoff, are ¼ fuel, ¼ thrusters, ¼ structure and ¼ payload. We could expect about the same payload ratio for a lightcraft. Some researchers expect that we could eventually get a payload of 40 percent of the total mass of lightcraft at liftoff.

With an allowance of 300 lbs. per passenger for body weight and luggage, a ten-passenger craft would weigh six tons and eat up $24,000 to $54,000 worth of laser power to make orbit. That's $2,400 to $5,400 per passenger on top of the investment equivalent to buying a new car.

But when you compare it with the $35 million it costs to rent the seven-person space shuttle for just one flight—maybe we've got something there. Heck, it costs $3,500 just to fly first class from Los Angeles to Sidney, Australia, round trip.

The Pilgrims had to save and borrow 14 years' income each to afford to move to Plymouth Rock. By the year 2000, if we push ahead with the lightship, the cost of a ticket to space will fall from today's astronomical figures to the cost of a trip to an Australian World Science Fiction Convention—less expensive than the Pilgrims' expedition. L-5 in 2005, anyone?


DIALECTIC OVERLOAD
CHALLENGE CYBERNETIC OVERVIEW
STANDARDIZE FEEDBACK
NOTE PRE-LOGIC INTERLOCK
DATA REVERSAL IMMINENT
RECYCLE PREVIOUS RUMINATION
REGURGITATE UNDERLYING SYLLOGISM
TILT
GROSE

The Software Are Coming!

A Horror Story for Educators

By JOHN C. LAUTSCH

DISC START:
Vidcom disc no: 670308 Educ. Hist.
Authorization Code: AXR 0000010-0011100100011100010 1.
Federal Expurgator's Index: NO OBJECTION [May be disseminated into interstate commerce].
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In the mid-20th century (Common Era), college campus life truly came unto its own. Giant campuses of tens of thousands of students dotted the land, and the bachelor's degree became the lowest common denominator in the skilled labor market. Billions of dollars poured into institutions and research pushed the frontiers of knowledge to where knowledge itself was inherently uncertain.

In the east, one of the country's oldest institutions, Harvard, excelled especially in the social sciences. Its graduate network ensured that the percentage of Harvardites in government and business exceeded all other institutions. In the west, the University of California excelled especially in natural sciences. Hitherto unknown elements of matter were christened with variations of its name. In between these two communities, like jewels in a priceless diadem, were arrayed other lights of higher learning all across the land. The business of higher education had arrived and its form was viewed by most as a permanent fixture of the nation's culture, to say nothing of its politics and economy. In 1981, no one dreamed that within five decades it would all end.

Today, looking back from the end of the 21st century, the historical decentralization of education in America appears measured and inexorable. But 100 years ago, to those caught unawares by the currents of electronic change, the movement was as swift and cruel as any Darwinian struggle could be. The newer forms of delivery of information were so much more efficient, so much more convenient, and evolved so quickly into higher and more interesting forms, that, as with life forms facing the changing Mesozoic world, the giant institutional dinosaurs never really had a chance. By the time many institutions even perceived what was occurring, the struggle was finished and they had lost.

By 2020, mighty Columbia had closed its doors. In the same year, the University of California was abolished by a citizens' initiative referendum as a needless taxpayer expense. In 2040, Harvard, the last to fall, ceased to admit students and settled down to serving as a government think tank and private business consultancy. Education was left largely to the electronic entertainment networks and publishers.

To understand how quickly and completely these mighty educational creatures succumbed, one must consider the tremendous forces that converged upon American institutions of higher education in the late 20th century. Sudden and outrageous rises in energy costs made operating buildings and university vehicles prohibitively expensive. Unionization escalated campus employment costs. Government regulation to achieve social policies, especially in the primary schools, escalated the cost of doing educational business. All of these forces diverted professional educators' attention from transmitting thought and culture.

These forces, however, could have been and were being dealt with, albeit slowly. The crushing blow came when the transportation economy ended—the economic structure that had formed the basis of higher education since the invention of the modern university in medieval Europe.

In ancient Europe, the great political and commercial centers grew at the junctures of major trade routes. Just as these bazaars encouraged art and culture, they spawned ancient institutions of learning. All important matters of politics, commerce and finance were conducted on a face-to-face basis. Education followed this pattern, and in fact, higher education went further: faculties and students came to occupy whole communities, some remaining within these specialized towns for their entire lives!

Then modes of communication began to improve. In 1844, the telegraph was invented, although at the time the need to communicate over increased distances even crudely was openly questioned. With the introduction of the telephone in 1876, long distance voice communication became quite efficient. The beginning of the 20th century found radio communication becoming widespread. Television was first demonstrated in 1927. *The New York Times*, however, doubted its commercial use.

Sometime after 1937 at Iowa State, John Atanasoff and his teaching assistant Clifford Berry invented an electronic digital logic circuit that was to inaugurate modern computing. Calling his device the "ABC," Dr. Atanasoff viewed his magnificent invention with all the marketing instincts of most seers at the time: He concluded it had little, if any, commercial value. Market research after the Second World War projected a national need for only 1,500 computers by the year 2000.

Not very often was the vast popular market for computerized communications devices correctly predicted—except by a few who became very wealthy. Less than a decade after Atanasoff's discovery, others had created UNIVAC I, the world's first commercial computer. By 1955, IBM had become the world's leading manufacturer of computers and within ten years the company had become one of the world's leading economic forces. In the 1960s, television spawned a powerful industry supported on a continental ocean of television

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receivers—receivers possessed by every other person in the country. By the 1970s, there were two radios for every adult in America. By 1978, 95 percent of all homes in America were electronically interlinked by the telephone system, and the entire system was on its way to complete digitalization.

In the last quarter of the 20th century, through networking, modern computing became a truly large-scale manipulation of information by electronics: it occurred on a continental scale. In 1971, the term *compunications* was coined by Professor Tony Oettinger at the Harvard Program of Information Resources Policy to refer to this process.

The 1970s also saw the advent of desktop home and business computers much more powerful than the original UNIVAC (which occupied a whole room). These microcomputers provided the means for sophisticated home and business use of TV, telephone, cable, video disk and all the other electronic communication means on the market. A popular expectancy grew that increasingly complex transactions could and would be accomplished at a distance by electronic systems. By 1979, even some complex financial transactions were being conducted electronically. One fourth of all homes in America had a microcomputer by 1985. By 1990, it was commonplace to receive virtually any information one wanted at home in real time via one's "electronic fireplace." The turn of the century witnessed instantaneous document transmission and teleconferencing so cheap that businesses (and many homes) could not afford to be without them.

Few in that era realized the economic implications of these developments. For example, it was not well understood that the telephone company, and not the transportation industry, had become the backbone of the immensely productive American economy. Nevertheless, research in the early 1960s indicated that the scale of a society's economy was directly dependent upon the speed and density of messages flowing within the society. Advances in electronics in the latter part of the 20th century produced a quantum leap in the speed, accuracy and number of information transactions in the American economy. The American economy burgeoned.

The entertainment industry was the first to understand that millions of persons throughout the country had become aculturated to electronic modes of communication. Color cathode ray tubes glowed for at least six hours each day in American homes. To the average citizen, not having a telephone was unthinkable. Electronic video games were conditioning large sections of the population to interactive use of video formats. The French called it *informatisation*, and it brought a fundamental transformation not only to the way we did business and governed ourselves, but to the way we Americans educated ourselves, as well.

It was not before the turn of the millennium, however, that those who managed the Ivory Tower realized that many found it not only cheaper, but more enjoyable to study at home or in their offices with the aid of video discs, cable and satellite transmission, rather than to spend thousands of dollars in time, tuition, room and board, and travel to attend a central educational institution to watch a professor speak in person. When this realization was finally made, it was too late. No amount of management skills could meet the competition colleges faced.

For most colleges, bankruptcy came mercifully fast. But the death throes of some major institutions sent shock waves throughout the land. Government funding and legislation were initiated to save the species, but to no avail.

Twentieth century research indicated that the human eye could grasp 16 times the information that the ear could. (We now know that 80 percent of all information in the brain exists as images.) A few pioneering teachers soon realized the implications of this and began attempting to adapt electronic formats to quality instruction. This involved depicting academic concepts as images rather than describing them in textbooks. For the most part, such efforts were disapproved and such professors were not promoted because they had failed to "publish" (by which curiously was meant to render instructional works in newsprint format).

Most instructors staunchly resisted any attempt to do other than deliver instruction via the static lecture hall format. However, when pitted against computer graphics, detailed action photos and the interactive displays possible through electronic digital information-processing techniques, the podium lecturer could not continue to attract students.

For most colleges, bankruptcy came mercifully fast. But the death throes of some major institutions sent shock waves throughout the land. Massive infusions of government funding and protective legislation were initiated as last ditch efforts to save the species, but to no avail. The changes in modes of information transference brought on by the microchip were occurring as universally and as inexorably as the spread of a new microorganism, and no organization escaped its influence.

Today education is largely provided by those companies that succeeded the record and movie companies of the last century. Freelance instructors live on royalties and a "star" system, something akin to the ancient Hollywood tradition, has evolved. Just as ancient authors used to submit written manuscripts to publishers, so today's budding professors often transmit their tapes to studios hoping an academic editor will spot theirs as a "best seller." It is clear that the modern mode of providing education to our 350 million citizens is not only considerably different, it is considerably better than last century's extravagantly wasteful tradition of students journeying to a professor's side to listen to him and to read printed documents under his personal direction—little more than an extension of the 19th century apprenticeship system.

Under the present system, the density of communications transactions nationwide has increased immensely. As a result, our economy has seen an unparalleled rise in personal incomes. Work that used to require millions of workers to commute to central downtown locations is now done from home offices. Communications costs are now distance insensitive, and business and education are transacted easily on a worldwide basis. All of these benefits are worth the small incidental cost of burying last century's geographically fixed dinosaurs of higher education.

[Cease revenue count]

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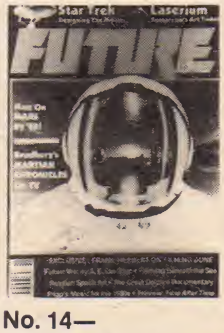

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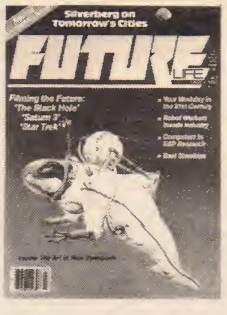

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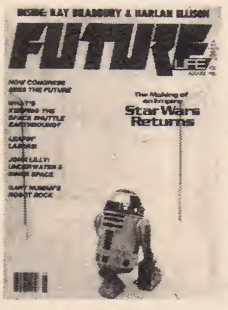

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Robert Anton Wilson on
human intelligence
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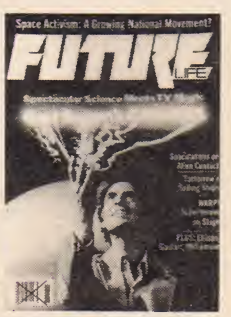

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Preview of *Cosmos*
Futuristic sailing ships
The pro-space movement

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Rundgren's Video Utopia
Is space worth the cost?
Interview: Norman Spinrad

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Flash & Altered States
Energy Alternatives
Tomorrow: Timothy Leary

TITAN

Saturn's cloud-enshrouded moon may yet reveal its mysteries.

By TOBIAS OWEN

Last August, the second Voyager spacecraft had its close encounter with the Saturn system. Last November, Voyager I gave us our first close views of the planet, the rings and several of Saturn's satellites. This latest encounter will provide different and closer views of all of these objects, and will show us some of Saturn's satellites for the first time. Three of the moons that will receive special attention are Enceladus, Titan and Iapetus.

The names of these bodies were assigned by John Herschel in the 19th century. They are chosen from Greek mythology to be associated with the legend of Saturn (Greek Chronos) the ancient ruler of the universe who was unseated by Zeus (Latin Jupiter), one of his sons. As part of this revolt, Zeus banished the brothers and sisters of Chronos to a place called Tartarus. These brothers and sisters were called Titans—hence our words titan and titanic, connoting large size, and the name Titan for Saturn's largest moon. Iapetus (as well as Tethys, Dione, Rhea, Hyperion and Phoebe) was one of the Titans, while Enceladus and Mimas were among the giants who fought unsuccessfully against Zeus and the other Olympian deities to try to liberate their relatives, the Titans. Enceladus was vanquished by the goddess Athena, who threw a huge rock that stunned and buried him, forming the island of Sicily. His struggles to free himself produce the rumblings and eruptions of the island's volcanoes.

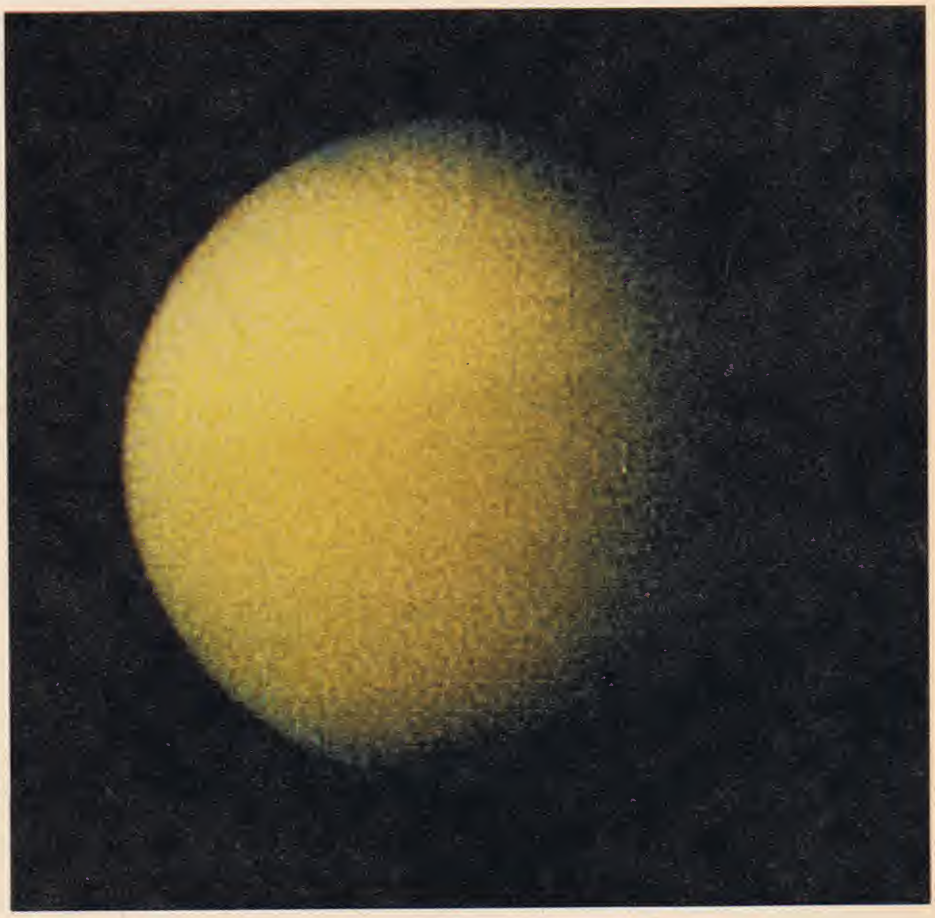
As we anticipate the discoveries of Voyager 2 and review the results obtained by Voyager 1, two of Herschel's choices for names seem remarkably prescient. Titan is not only the largest of Saturn's satellites, it has an atmosphere that is denser than our own. And our current view of Enceladus suggests that this small icy body, only one-seventh the diameter of our Moon, may be undergoing some rumblings and eruptions reminiscent of those on Sicily. Apparently this satellite is a contemporary source for the myriads of tiny fragments that form Saturn's tenuous E-ring. And then there is Iapetus, appearing in Voyager I pictures as a giant Yin and Yang symbol with one hemisphere some five times darker than the others. Just what is causing this remarkable difference in reflectivity—unique in our solar system—remains unknown. (This effect is so remarkable that Arthur C. Clarke suggested it might have been produced by an alien civilization as a kind of "signpost" in his book and screenplay *2001: A Space Odyssey*.) The bright side resembles the bright icy inner moons of Saturn, while the dark side has spectral properties similar to those of comet nuclei. But we must wait for the closer views from Voyager 2 before we will know just what the detailed properties of these two surfaces are.

Meanwhile, we have already collected a large amount of new information about Titan, information that suggests that this satellite may offer us some important clues about the early history of Earth. In some future time, our descendants might even use this moon as a giant laboratory to carry out experiments to test ideas about the origin of life.

Titan's present atmosphere is primarily composed of nitrogen, just like Earth's, but there is no oxygen and no carbon dioxide. The next most abundant constituent appears to be methane, which we are familiar with on Earth as natural gas. There is also some indirect evidence that a significant amount of argon may be present, perhaps even exceeding the methane abundance. Methane was detected by means of spectroscopic observations from Earth in 1944, but it took Voyager 1 to find the nitrogen, since this gas does not reveal itself in those parts of a planet's spectrum that are visible from the Earth's surface.

In the 26 years between the discovery that Titan had an atmosphere and the definition of that atmosphere by Voyager 1, many additional observations of this intriguing object were car-

Above: This close-up view by Voyager I of the limb of Titan shows the haze layer (color-enhanced blue by computer to show the contrast) surrounding the satellite above the smog-filled atmosphere.
Right: This full-disk shot of Titan was taken by Voyager I from a distance of 2.8 million miles. Larger in diameter than the planet Mercury, the bizarre giant's surface is totally obscured by a thick layer of atmospheric haze. In this photograph, the only discernable features are a faint boundary between the southern and darker northern hemispheres and a dark "hood" shadowing the north polar region.



PHOTOS: JPL/NASA

ried out with telescopes on Earth and in Earth orbit. It gradually became apparent that Titan's atmosphere must be filled with a photo-chemical smog—a haze of small particles produced by the action of sunlight on the gases in the atmosphere. Traces of acetylene, ethylene and ethane were detected, indicating that some of the methane was being broken apart and the fragments were recombining to make these other gases. Further reactions form the smog particles which in turn absorb sunlight and heat the upper atmosphere, making it much warmer than anyone had expected (but still a chilly -148 degrees F!).

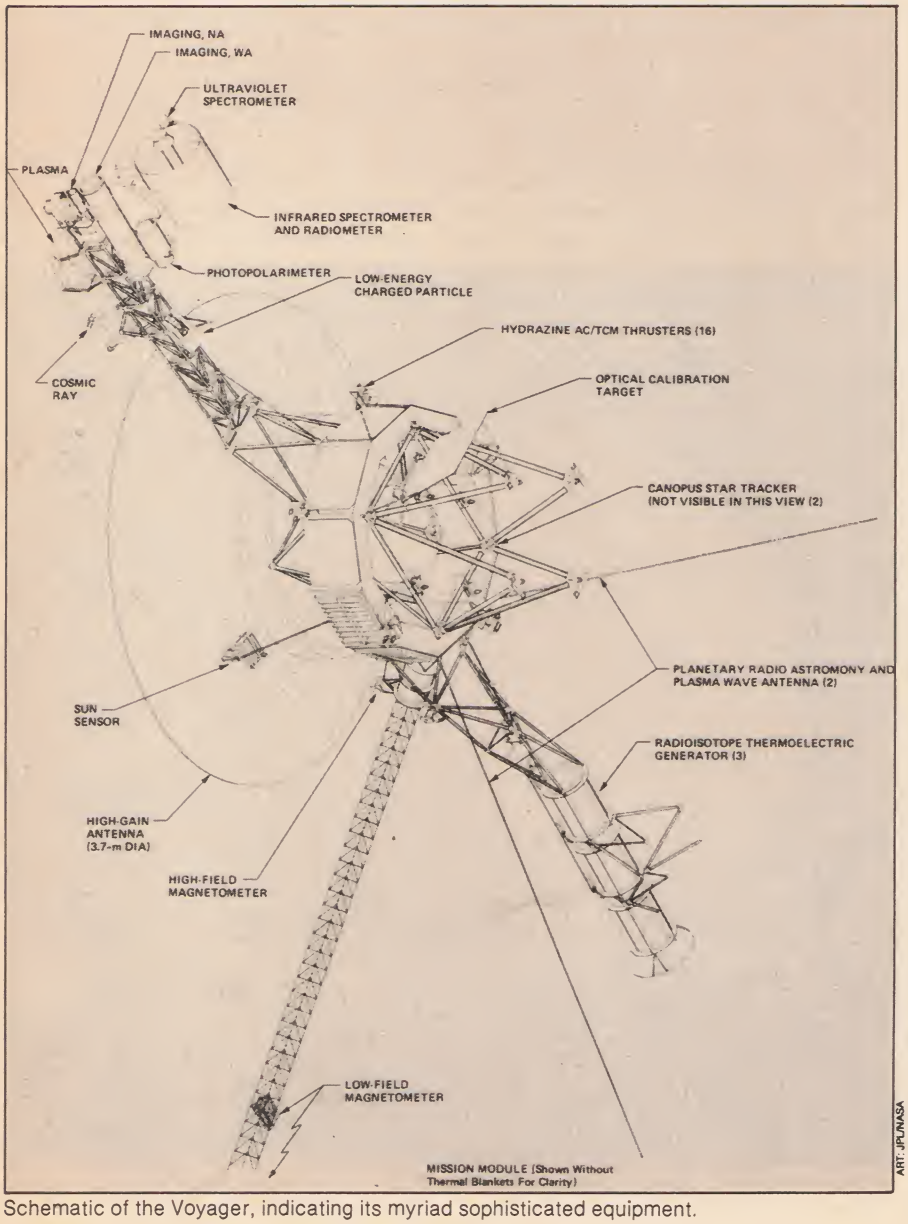
These indications of atmospheric chemistry were extremely interesting to scientists concerned with the evolution of planetary atmospheres and the origin of life. It is commonly agreed that life on Earth began in an environment very different from the one we live in today. The primitive atmosphere on our planet must have had no free oxygen, otherwise the organic compounds required for the origin of life would not have formed or survived. Thus the chemical reactions taking place in Titan's atmosphere today might tell us something about the chemistry that occurred on our own planet to produce that remarkable property of matter we call life.

Unlike Jupiter and Saturn, which also possess primitive atmospheres, Titan, like Earth, is small enough that hydrogen atoms can escape from its gravitational field. When methane or other gases are broken apart by sunlight, the hydrogen that is released can escape from Titan and the fragments left behind are free to combine to form more complex substances. These larger molecules can combine to form aerosol particles that ultimately rain down on the satellite's surface. It has been estimated that a layer of carbon-rich material over a kilometer thick could have accumulated on Titan in this way. One could imagine that further reactions might take place on the ground, depending on local conditions such as the temperature. Jupiter and Saturn do not possess solid surfaces which is another mark against them from the point of view of a scientist interested in environments suitable for life.

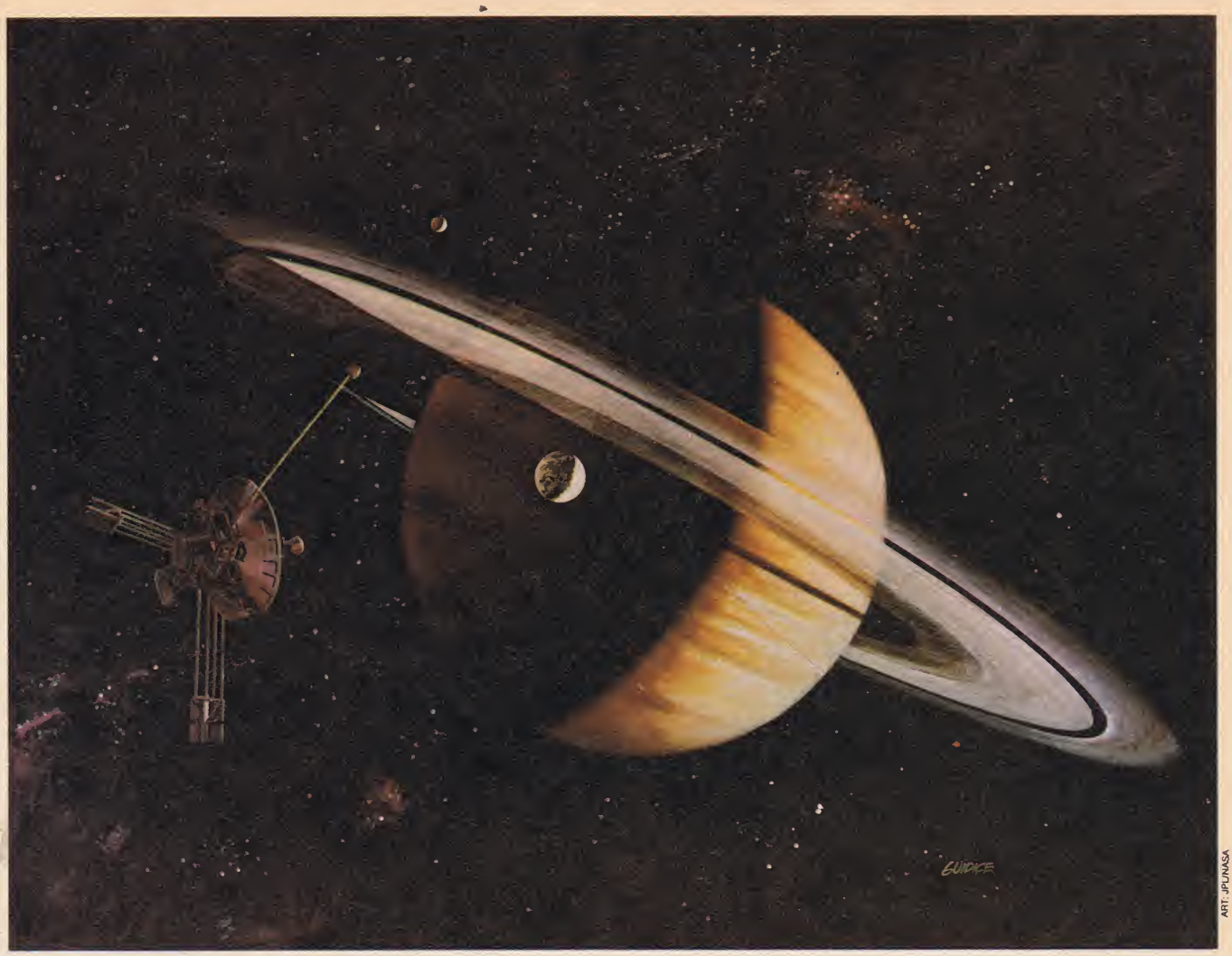
So what is the surface of Titan like? We first want to know how big this satellite is. The first accurate determination of Titan's size was made when it passed behind our Moon as seen from Earth. By observing the way in which the light from Titan diminished, it was possible to deduce that this object was nearly 5800 km in diameter, which would make it larger than our Moon, the planet Mercury and Jupiter's largest satellite, Ganymede. But the measurement referred to the smog-laden atmosphere and left open the question of the size of the solid body underneath that veil of smog and gases.

The same problem existed for Titan's surface temperature. Radio telescopes were needed for this determination, since radio wavelengths will penetrate clouds, smog and atmosphere, as we know from our everyday experience of listening to the radio or watching television on cloudy days. Any body not at absolute zero is radiating some energy in the radio region. The results were ambiguous, however, because of interference from Saturn, which appears very close to Titan when seen from Earth. Thus there was one measurement suggesting a low value (-280 degrees F) and one that indicated a high value (-100 degrees F or higher). The high value was especially intriguing—it is warmer than the record low recorded on Earth—because it would require a very efficient atmospheric greenhouse to raise the surface temperature so far above the value of -360 degrees F expected for an object at Titan's distance from the sun. This seemed to imply a thick atmosphere and surface conditions that might include some very interesting chemistry indeed. There even seemed to a possibility that some form of life might exist on Titan.

Unfortunately for those interested in such possibilities, it soon became apparent that Titan was not quite so warm. Just prior to the Voyager 1 flyby, some measurements of the surface temperature were successfully carried out with the Very Large Array (VLA) of radio telescopes on the plains of San Augustin near Socorro, New Mexico. This remarkable instrument has enough an-



Schematic of the Voyager, indicating its myriad sophisticated equipment.



This NASA art shows the Voyager satellite on its fly-by of Saturn and its multitude of moons.

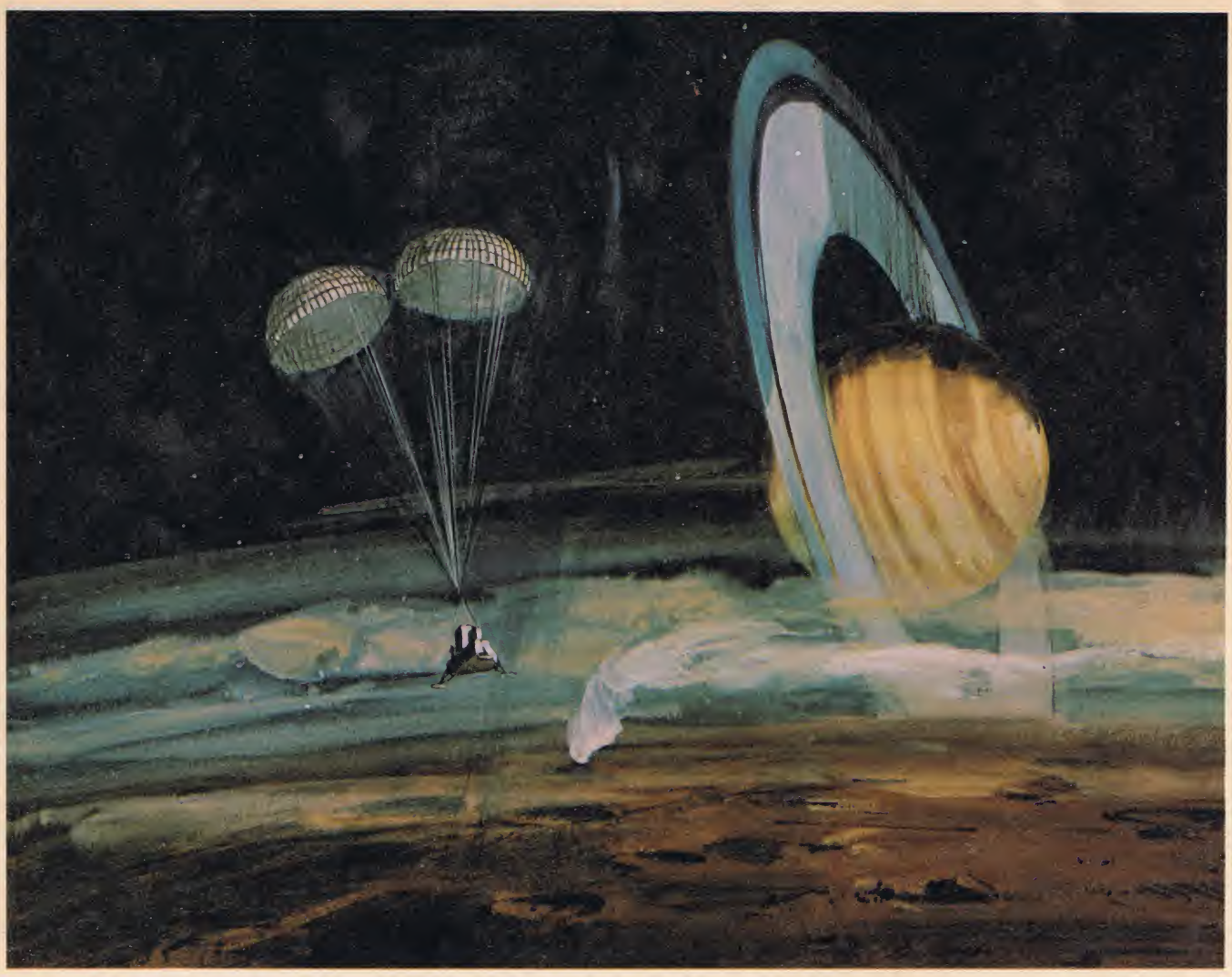
gular resolution to discriminate radiation from Titan clearly from interference by Saturn. The data indicated a temperature of about -300 degrees F or 87 degrees on the Kelvin scale, just ten degrees above the normal boiling point of liquid nitrogen. Most scientists think this is much too cold to allow the subtle interaction of matter and energy that could lead to life.

That is how matters stood as Voyager 1 approached this giant moon. The space-craft provided a huge increase in our knowledge. The pictures of Titan were rather disappointing, since they show no evidence of surface detail, or even any well-defined clouds. Instead, we see a fuzzy object looking rather like a tennis ball with no seams. Closer inspection reveals that the southern hemisphere appears slightly brighter than the region north of the equator, and there is a dark hood over the north pole. In our high-resolution pictures, we could see a haze layer completely surrounding this object. So the Voyager pictures provided the final confirmation of the existence of a smog-laden atmosphere that had been deduced from Earth-based observations.

Other instruments on the spacecraft produced more exciting news. The Ultraviolet Spectrometer detected atomic and molecular nitrogen in the upper fringes of Titan's atmosphere, while the radio occultation experiment demonstrated that the atmosphere exerts a surface pressure 1.6 times the sea level pressure on Earth. The surface temperature was determined to be close to 93 degrees K (-292 degrees F), indicating that methane must condense, forming ponds, lakes, or even oceans. Thus on this satellite, natural gas plays the same role that water does on Earth, being a liquid at the surface and a vapor in the atmosphere. The solid form may exist at slightly colder regions on Titan. But unlike water ice, methane ice won't float in its liquid, so we can't conjure up images of methane icebergs!

The occultation experiment also succeeded in measuring the diameter of Titan's solid surface, which turned out to be 5120 km, still larger than Mercury, but slightly smaller than Ganymede. Combining date from this experiment with results from the Infrared Spectrometer, it was possible to show that molecular nitrogen must be the main constituent in this massive atmosphere, just as it is on Earth. However, it appears that nitrogen alone will not explain the observations. There must also be a small amount of some heavier gas that has not yet been detected directly. Argon, which is one percent of our atmosphere, is a likely candidate.

Our expectation that this satellite would be an exciting place to trace out the first steps in pre-life organic chemistry seems richly borne out by the results from the Voyager Infrared Spectrometer. This instrument showed that in addition to the trace gases we have already mentioned, Titan's atmosphere contains propane, methylacetylene, diacetylene, cyanoacetylene, cyanogen and hydrogen cyanide. These last two gases are especially interesting, since they play key roles in experiments designed to simulate the formation of complex organic molecules on the primitive Earth. For example, it is possi-



The only hope of solving the mysteries of life on Titan would be to send in a Viking-type probe, as envisioned in this artist's concept.

ble to synthesize adenine, one of the bases found in the nucleic acids, directly from hydrogen cyanide. Still more complex substances are probably also present on Titan. The smog particles themselves may be composed of polymers that include some of the substances we have already mentioned.

So here we have a huge natural laboratory, where spontaneous experiments are taking place even now, and where a record of previous results is maintained in deep freeze, just waiting for a probe or a lander to explore them.

What would it be like on Titan? Sitting in a boat in a methane sea, we would find the surroundings quite dark. That thick haze that blocks the Voyager view of Titan's surface also prevents sunlight from filtering down and illuminating the scene. Thus even at high noon, the landscape may be no brighter than a night on Earth lit by the full moon. The largest particles from the photochemical smog would be drifting down to the surface, as would methane rain or snow coming from passing clouds. The smog particles would settle on the surface, dissolving or floating in the seas and forming accumulating layers on solid ground. These layers might be interspersed with methane snows, rather like the layering observed in some glacial ice deposits on Earth. For Titan does have seasons like ours, they are just 30 times as long! They also seem to occur out of phase with the position of the sun—winter occurs when it should be spring, spring when the calendar says its summer, etc. This seasonal lag is caused by the long time required to heat this thick atmosphere at such a large distance from the sun.

> "Here we have a huge natural laboratory just waiting for a probe or a lander to explore it."

Titan must once have been considerably warmer than we now find it in order to allow ammonia to be present in the vapor phase, so it could be broken apart by sunlight. The hydrogen produced by this process would escape into space, while the nitrogen would remain behind to form the atmosphere we now observe. In this early era, the surface temperature may have risen to the point that liquid ammonia would be stable on Titan's surface, since the ammonia vapor and the transient hydrogen gas would provide an efficient greenhouse effect. Under these conditions, the chemistry that occurred might have been even more interesting than what we find happening today.

But before we get too carried away by possible analogies with the primitive Earth, we must remember that there is no water available to participate in these reactions on Titan, nor is it likely that there ever was. Water is there all right, but it is frozen out as ice, except for a possible liquid mantle well out of reach

PHOTO: JPL/NASA

The satellite Iapetus, fully illuminated, as seen by Voyager I. The dark hemisphere is some four to five times dimmer than the bright one. The bright spots are "noise" in transmission.

of surface chemistry. This means that there is no source of oxygen either, since it will all be tied up in the ice as H_2O. Thus, oxygen-containing compounds such as amino acids, the famous building blocks of proteins, cannot be synthesized on Titan. That is also the reason that we still find methane in this atmosphere, instead of the carbon dioxide that dominates the atmospheres of Mars and Venus. Even on Mars, it is warm enough for water vapor to be present in the atmosphere, thus providing a source of oxygen that could combine with any primitive methane, converting it to carbon dioxide.

So as we sit in our boat in the methane sea on Titan, we may think about trying to retrieve some fascinating chemical fossils from the shore, or even from the sea itself, but it seems highly unlikely that we should try any fishing!

Voyager 2 is not likely to bring us much new information about this satellite, since it passed much farther from it than did Voyager 1. There was no radio occultation, and the ultraviolet and infrared spectroscopy was not as productive. This is a necessary consequence of our desire to send this spacecraft on to Uranus (1986) and Neptune (1989). Nevertheless, we hope to have obtained some new views with the imaging system that will allow us to look for possible changes in the atmosphere, including motions produced by local winds.

So the next step in Titan exploration is to send a probe or, even better, a soft lander that could make measurements in the atmosphere and on the surface. Then we would be able to obtain detailed information about the chemistry that is occurring here. Thinking way ahead, we might even consider the possibility of one day establishing a research station on this satellite, supplying the energy necessary to melt water and create an environment that simulates primitive Earth more closely. It may be that we will never be able to approach the chemical conditions under which life originated on Earth until we can perform experiments on such a grand scale as this. In our solar system, Titan offers the best environment for such activities. It gives us the opportunity to engage in a kind of cosmic time travel, to explore a contemporary environment that offers a model for some of the events that occurred in primitive times on our planet. So as we sail past Titan on our way to Uranus and Neptune, perhaps feeling some frustration with its cloudy appearance, we may take comfort in the certainty that one day humans will return for a closer look. F

NASA photo

Our Space Future:

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America is proceeding in some areas of space exploration. But we are not taking full advantage of the energy and material resources of outer space. Even though we know these resources are enormous.

FACT: The space shuttle—already underfunded and over 2 years behind schedule—will never be fully utilized in such a 'bare-bones' budgetary climate. And one government report predicts a 'knowledge explosion'—if the United States fully enters the new age of space exploration and development.

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•INTERVIEW•

Gerard K. O'Neill

By BOB WOODS

Gerard K. O'Neill is best known for his concept of space colonies, an idea that has sparked the formation of scores of pro-space colonization groups, including the L-5 Society. His realistic plan is detailed in The High Frontier, *published in 1974. Dr. O' Neill's background is in physics, which he teaches at Princeton University. His research projects there have included development of the mass driver, a high-energy transport system utilized in his plans for extraterrestrial mining operations. He is the founder and president of the Space Studies Institute, a non-profit foundation which funds critical research connected with O'Neill's space development work. Dr. O'Neill recently moved, with his wife Tasha Steffen and their daughter, to San Carlos, Calif., and will begin a sabbatical at the University of California at Berkeley.*

FUTURE LIFE caught up with Dr. O'Neill the day after he returned to Princeton from a national publicity tour in connection with his new book 2081: A Hopeful View of the Human Future *(Simon and Schuster, $13.95), a four-year effort that delves into such areas as space travel, household computers, talking robots, land travel in high-speed vacuum tunnels and, of course, space colonies. All are technological advances which the author deems inevitable within the next century.*

Keeping your concept for space colonization in mind, how do you feel about the successful maiden flight of the space shuttle? Is this the first step in your overall plan?

There have been two developments that are very important in the last several years. The [first is the] creation of the shuttle. Work that I've been involved with has been entirely predicated on the space shuttle. The other development is that now we are providing other nations with launch capability. It is this rapid proliferation that really guarantees that something like we've been working on is going to happen. The shuttle is no longer the essential step, because of the fact that there are all these other nations that want to take advantage. For example, the Ariane [a rocket designed, built and successfully launched by the European Space Agency] has a launch cost which is not that enormously different from the shuttle in dollars per pound. And they're already talking about a manned version of the Ariane.

Do you think there is going to be international competition, by your target year of 2081, in the colonization of space? And is the United States now moving its space efforts in the right direction?

I think the [U.S. is] going to have a very tough time, and [we] are going to have to get our act together if we're going to be in competition. Soviet space work is quite logical—not very exciting or unusual, it doesn't represent any great leap forward—but I think it's a very sensible program. The decision that they would have a large launch vehicle and a small crew return was a very intelligent decision in terms of most of the missions that anyone is talking about so far. As long as you're talking about a purely scientific program where there are not large numbers of people, you're probably a heck of a lot better off sticking to simple, throw-away launch vehicles.

I talked to the former head of NASA, for example, and one of the things he was unhappy about was that the Japanese had developed all these separate launch vehicles. They obviously want their independence; they want to be able to do things on their own. The French and the Germans went ahead and developed the Ariane in direct competition with the shuttle.

What do you see as some of the near-term benefits of the shuttle program?

In an article that I was asked to do for *The Los Angeles Times* I pointed out that a relatively near-term use of the shuttle is to set up what is, in effect, a combined orbital vacation-resort hotel and scientific station. Someplace where people who have an interest in science can be brought up into orbit by the shuttle, spend a month or so under quite luxurious conditions, attend seminars and see some spectacular views of the outer planets and the cosmos.

Suppose somebody comes to work for a company—all of the desirable, sought-after occupations like computer programmers and electronic engineers. A company signs up somebody saying, "Work for us for five years, we'll match your contributions for a fund that will bring you into space, and if you stay with us through the full five years then you'll get your one month in orbit." It works out to about $100,000 that the person has to come up with, spread over five years, and there's interest coming in during that time. It's something between $10-15,000 a year that somebody would have to save. And there are a heck of a lot of young people who are earning plenty of money to be able to set aside $10-15,000 a year over a five-year period.

In this same sense, do you foresee the private sector playing a dominant role in the development of space? Do you think NASA, with its continuous budget problems, will continue to be the main source of the space program?

It's going to be a confused, unpredictable mess. It is not going to look like a logical plan when you see what happens, any more than what we see around us now in the early day of the space program looks like a logical plan.

I think that inevitably NASA is going

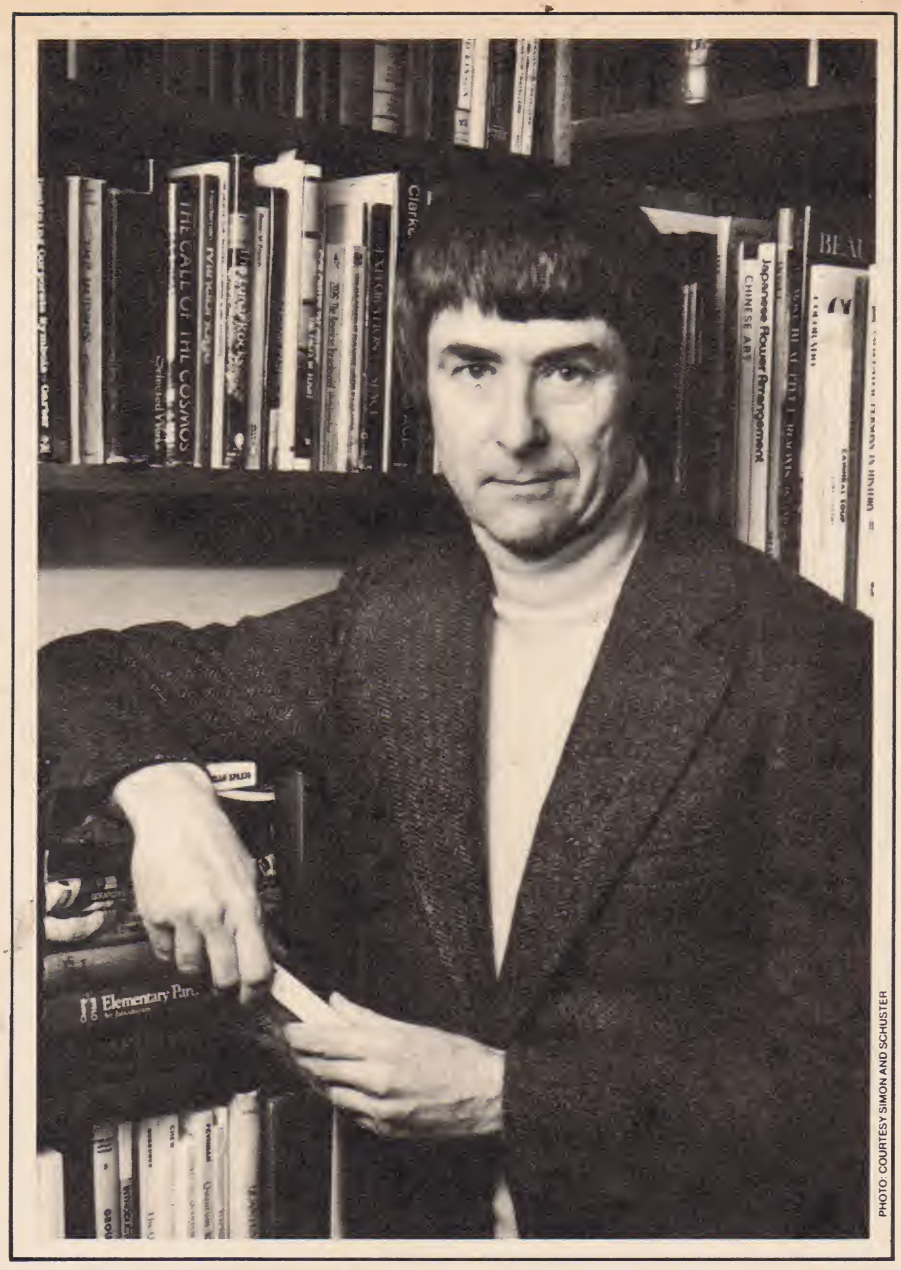


PHOTO: COURTESY SIMON AND SCHUSTER

to shift out of the responsibility of running the shuttle. I think that many people within NASA are not interested in having NASA stay in the shuttle operations. It ought to be turned over to some private outfit to run. There are already rumors of airlines that are conducting internal promotional campaigns to try to be selected as the outfit to run the shuttle.

There is going to be important private sector involvement. Government programs are probably going to be involved too—Department of Defense and civil programs —it's going to be a confused mess. But somehow, helter-skelter, competitively, inefficiently, there will be this movement upward into space.

What types of research is the Space Studies Institute presently involved in?

Well, we have two research projects that are very active at the present time. One is the mass driver research. We're now just beginning to construct the first of the new kind of mass driver that's been developed in the last eight or nine months. It provides the possibility of much higher acceleration, a much higher efficiency and also much greater simplicity. It is very different from the original. The only superficial similarity is that you still have a whole lot of coils along an axis. It's gotten rid of an enormous amount of complexity in the system. We now feel quite confident that we can work up to accelerations of the order of 18,000 gravities, which means that you're going from zero to 250,000 mph in [the first] 10 inches of the machine. The test model that we're just now starting to build in the physics department is designed for that acceleration.

Where does the major funding for the institute come from?

The sustaining core of it, in terms of being able to make long-term commitments, is what we call our senior associates, who are now several hundred people who make commitments of pledged gifts to SSI on a five-year basis. That's extremely important because, of course, government programs are all from year to year. This way we can make a commitment and follow it up.

The other major research we have is the [chemical] processing [of lunar materials]. This is a grant which was won by a consortium of Rockwell International and the University of California. They have been charged with measuring all of the chemical reactions that are required for the separation of lunar soils into pure metals, which is clearly on the critical path of all this research.

We are thinking of other giants in the chemical-processing area. For example, such things as very simple methods for obtaining oxygen from lunar soil. I think that as time goes on we're going to get more and more use out of lunar materials, because they're just too well placed. It makes too good economic sense.

One of the things you're going to need in high orbit is the shielding from the cosmic radiation, so I think that the first use of non-terrestrial material is for shielding. The second use is almost as general and that is to process the lunar material just for its oxygen to supply rockets operating in space. It's pretty clear that for a very long time all of the fuel that will transport just about anything will be plain old oxygen-hydrogen rockets.

In *2081* you discuss future land transportation systems that employ electromagnetic propulsion through high-energy vacuums. Now, I recently spent two hours on the Long Island Railroad on a short trip that normally takes 45

minutes. It seems that mass transportation in this country is at a critical point.

It's because of a decision that was made by the Department of Transportation in 1974 when it essentially cut off all government funding of advanced transport systems. It's just lucky that Germany and Japan continued, but then we will have to buy back all those systems. It's not going to help our balance of payments any to be the buyer rather than the seller. In the competitive world that is not a very good situation.

I think that the only reasonable hope is that some very small entrepreneurial outfit would start something. I think it is extremely exciting what many individual Americans have done over the last 10 to 15 years in the way of starting small companies and supplying new things that didn't exist before.

In your new book you also propose the use of solar power satellites for Earth's energy needs. But so much of the energy efforts of late seem to be in other directions, namely synthetic fuels, nuclear, coal, etc.

I think it's clear that one way or another the world is going to come up with the energy it needs for growth. It doesn't involve worldwide cooperation. It's the continuation of the nationalistic competition. And all the developing nations are all trying like heck.

I'm concerned about any of the synthetic fuels that are based on coal. I don't like them because they are going to pump carbon into the atmosphere. And we just don't know about the long-term effects, unlike satellite power, where if you decide you made a mistake you can pull the switch and that's it. With coal and nuclear power you can't go backwards. From that point of view I worry more about the carbon than I do about the radioactivity. The radioactive wastes are at least in moderate quantities. We really can do something about them. But once that carbon is up in the atmosphere, there's no way to get it out. So I feel that satellite power is indeed the most environmentally acceptable form of energy for the future.

Which leads to your strong overall environmental concern prominent in both *2081* and *The High Frontier*.

I think the environment is going to be very much more important in the future. One of the reasons why the doom-and-gloom prophets are so wrong is that they just don't take into account human reactions, the fact that people react to do things when they perceive a situation is really bad. And certainly the correlation between a country's level of affluence and its environmental concern is extremely strong. We had no such concern until we got off to a reasonable state of affluence in the early part of this century and guys like Teddy Roosevelt started going around. The first national parks started being set up and things of that kind. Now other countries are coming up to the level of affluence where we were. Germany's doing beautifully; they're very strong. And Japan, which had no environmental concerns until a few years ago, I figure they are spending something like two percent of the GNP into things that are directly or indirectly environmentally related. This is essential in identifying those technologies which I consider viable for 2081 and that will make it in the marketplace. I feel that a condition for making it in the marketplace is that they must be environmentally more benign than the technologies that they replace.

Yet the Reagan Administration seems intent on reversing much of the environmental legislation passed during the last decade, particularly clean air requirements.

That's right, but I'm afraid that there's another lesson in there. And that is that when you try to satisfy environmental requirements by patching up an existing technology that basically doesn't cut it, it's not going to work very well.

What was done during the 1970s was essentially patching up the internal combustion car by adding on the expensive catalytic converter and by making various changes that reduced the fuel economy. The catalytic converter required the use of a particular type of gasoline that was expensive. That's what happens when you have a terribly unsatisfactory technology and you try to patch it up. It always costs more money and it's not very effective.

Is your philosophy espoused in *2081* and *The High Frontier* of a utopian nature?

Quite the opposite. The point of the utopian idea was always that you took the technology the way it was and came out with what was essentially a social construct; it was a plan for living. You said to people, "Okay, here's this plan for living. If you do things my way, everything will be fine." And even in some of the utopian colonies that were set up, you survived reasonably well. Some of them are still in existence today.

But that is a completely different thing from my space colony idea, which is to say, it's not for me to prescribe how people want to live their lives. As far as social systems are concerned, that's for them to choose and ideally to experiment with to find the good ones. What I want to do is open up a bunch of new technical possibilities that will give everybody a wider choice so they can do their own thing. So in a way it's absolutely contrary to the utopian idea.

Do you see the proper types of social and technological advances taking place today that will lead us to the world outlined in *2081*?

Everything that I wrote into *2081* was the result of a set of choices that I regard as inevitable. *2081* is not a utopian vision of a perfect future. If you read it carefully, you will see that most of what we regard as problems, that we are not solving now, we will still not be solving 100 years from now. But without really solving any of those problems, just by the inevitable movement of new technical developments and economic growth, I see the world of 2081 developing. What is not inevitable is what role a particular country plays. In the chapter "For Richer, For Poorer" I made some guesses as to how things will develop, and the already advanced natures of Germany and Japan. That's perhaps the most speculative part of *2081*. I'd say that the betting odds right now are that it would probably be Japan.

It's important to realize, as I point out in the first section, that over the course of 100 years, something like half of the countries in the world have changed their names. So predicting exactly who's going to be on top and in what degree is probably the hardest thing to do. It's the part of [the year] 2081 that I regard as the least certain. But the development of the technologies, I regard as inevitable, except for the one wild card—that we blow ourselves up.

There is one more important thing I should say. And that is while it is true that *2081* is sort of a centerline of realistic predictions, it's also true that I felt that I had a responsibility in writing it to point out that this was the realistic future, that this is where the future is leading. I [could not] let all the doom-and-gloom prophecies stand unanswered. An awful lot of people were becoming discouraged by hearing this constant repetition of how things are going to hell and there's no hope. They were just giving up and saying, "Well, what the heck, why do anything?" It's very important that people be shown what's possible in order that they realize it, that they make it happen.

Janny Wurts

Janny Wurts is one of those irritatingly talented people who seem to excel at whatever they turn their hands to. Born in 1953, the young woman is not only a gifted artist, as attested to by her work here, but she is a writer as well (her first novel, *Planetsplicers of Pendaire*, has just been accepted by Ace Books).

After graduating from Hampshire College in 1975 with a degree in creative writing and illustration (she also worked as a lab assistant at the college's astronomy department), she decided to take up science fiction and fantasy as a full time career. "I was interested in science," Janny explains. "I did work in microbiology and work in marine biology and also in astronomy, and I became fascinated with it. I decided I didn't want to spend my life on a computer because I have a lot of other interests. So it turns out that with art and writing I can do whatever I want to. And everything I do, no matter whether I work in science for a while or whatever, it comes right back to my painting and writing."

Janny's paintings have already been featured in several shows; for example, her work was exhibited at the "Women Fantasy Artists" show last year at Boston's Earthlight Gallery, and also in a recent show of SF art at Brooklyn Collector in New York City. Additionally, she has done several book illustrations, and has had four full-color paintings made into greeting cards.

The works shown here are illustrative of Janny's style. The painting above, which is titled "Interstellar Fuel Station," was created in order to satisfy rather stringent publishing requirements. "It was painted with two colors only," says Janny. "It was painted in red and blue for what they call a duotone separation, when they photograph with a blue and then a red filter, and then they reproduce only in two [as opposed to the normal four] colors. I spent a week figuring out which colors to use so that you couldn't tell it was only two colors of paint. There was a small fanzine, *Solaris*, that wanted it for their cover."

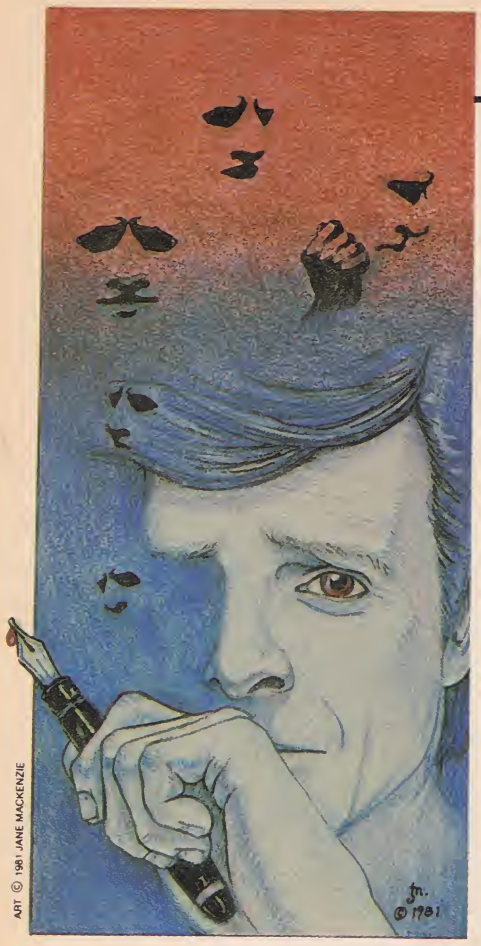
The featured centerspread, "Liftoff," is Wurts' tribute to the space program. " 'Liftoff' was inspired by a photograph of the Apollo nightlaunch," she explains. "I thought that I was adding an extra effect when I added the second halo. It turned out that a friend of mine was there in the press space, taking photographs, and he said that the extra halo did not show up in any photograph, but in fact there was one!"

Centerspread: "Liftoff" ©1981 by Janny Wurts →


JANNY WURTS
© 1980

harlan ellison

AN EDGE IN MY VOICE



Look: since this is something like a couple of months beyond my first anniversary at this job, already a year down here in the trenches with you, it occurs to me that maybe there's a thing you ought to know about me. No big deal revelation, just a setting forth of credential that's slipped through the interstices. It is tendered before I get down to the second part of the bloody disembowelment of that hircine chunk of celluloid called *Outland*, begun last issue. And it is this:

I don't just *like* movies; I *love* them.

Your humble columnist sees something like two hundred films a year. What I don't catch at studio and Writers Guild screenings or first-run in theaters, I see on the cable movie channel or on airplanes or in hotel rooms when I'm on the road. Additionally, I have a Betacassette library of over 200 films that I run over and over to study techniques of film writing, or to analyze scenes that stick in my mind. I am, after all, in the business of writing motion pictures; and I take the craft seriously.

What I'm getting at here, is that you're not dealing with just another pretty face. I am hardly a *nouvelle vague* journalist swaybacked 'neath a freightload of academic terminology—I am still bored to tears by *L'Avventura*; Claude Lelouch's films seem to me as empty as Phyllis Schlafly's head or Reagan's rhetoric to the NAACP convention; and I don't give a damn if Spielberg *didn't* explain how Indiana Jones could hang onto that Nazi sub's conning tower for 2,000 submerged international nautical miles, because I love *everything* about *Raiders of the Lost Ark*. Like you, I go to movies to be dazzled, enriched, entertained and uplifted; and to give myself over with the trust and innocence of a ten year old.

Thus it pains me to have to swat away the foul ball canards of those very few dullwitted among you who contend that merely because I don't accept each slovenly wetbrain of a "sci-fi flick" as the greatest thing since *Crime and Punishment*, that I am an effete snob unfit to sample the wizardly wares of Holly and Wood. So as credential for my overbackwards even-handedness about films, I offer here a short list of movies I've seen in the past four or five months, grouped simply enough as to those I liked (to greater and lesser degree without minor carps) and those I thought gummed the big one.

AYES: . . . *And the Band Played On, Tess, My Bodyguard, Tell Me a Riddle, The Man with Bogart's Face, Twinkle, Twinkle, 'Killer' Kane, Brother, Can You Spare a Dime, The Hunter, Tom Horn, 6th and Main, The Last Metro, Fort Apache, The Bronx, Kagemusha, the Shadow Warrior, La Cage Aux Folles II, Knightriders, Thief, Night Hawks, Altered States, The Four Seasons, Raiders of the Lost Ark, Escape from New York, The Great Muppet Caper* and *For Your Eyes Only*.

NAYS: *Nine to Five, Falling in Love Again, The Howling, Seems Like Old Times, The Mirror Crack'd, Tribute, The Hard Way, Cruising, Bad Timing, The Earthling, Back Roads, Where the Buffalo Roam, Starcrash, The Hand, Outland, Bustin' Loose* and *Superman II*.

I've tried to discern a pattern, but apart from utterly subjective gut-reactions that I came away from these films either positive or negative, the only codifiable statistic is that of the 40 films noted above I liked 23 and disliked 17. I'm not sure that tells us much; except that I go to a film predisposed to enjoy; and only what they throw up on the screen changes my mind.

The foregoing: presented as testament to the innocence and intent-to-enjoy of the critic. Presented: to avoid the nonsalutory prejudgment that the critic *wants* to eviscerate moron films such as *Outland*. I don't. But I must. For all of us.

And I think going to see a film as pluperfectly dazzling as *Raiders of the Lost Ark* makes the point so manifestly, all words of further argument can be dispensed with. Sitting there during *Raiders* I kept hearing that voice in my head that all-too-often makes snide remarks about what I'm watching. But this time it kept saying, "Yes! Dammit, *yes*! This is what all the others should have done for me."

Raiders is so sensible, so magical, so *dear* a film, that one cannot keep from being dissatisfied with all the others—including *Star Wars*—that promised to take us out of ourselves completely. The film has the power of chronokinetics: it moves a human being through time. I became ten years old again, even as I retained my adult faculties of discrimination and erudition; but my childlike sense of wonder, my perception of place and age were whirled backward. I was a kid again, enjoying a film not just in the prefrontal lobe, but in every micromillimeter of exposed skin and nerve-ending. It was *total*; and becomes the cinematic trope for the word "entertainment."

If you can recapture what *Raiders* does to a filmgoer, and apply that elevated standard of visceral manipulation to all the other films in this genre, then I need never again go to these lengths in gutting such a drooling idiot of a film as *Outland*.

To recap my last column. One cannot help but resent and distrust a film that makes so many gratuitous errors; that fails to demonstrate even a first-year high school student's basic understanding of science or medicine or logic; that manipulates plot and characters in such a patently cheapjack manner to the service of a ripoff comic book plot; that denies everything we know about human nature; that is, simply put, so clearly a derivative shuck.

The core of contempt this film congeals in me lies with the basic concept. By admission of the writer/director Peter Hyams in many interviews, he approached the producing entities Warner Bros. and the Ladd Company with

single sentence *precis*: "It's *High Noon* in outer space." And they cut a deal on the spot.

Let me sidetrack for just a moment.

Likely it won't surprise you—what with my ill-deserved rep as a cranky esthete—that I admire critic John Simon with very few reservations. The veneration, in this instance, extends itself to presenting a recent quote from Simon that subsumes as epigram the point this sidetrack makes.

He wrote: "I remember one of my freshman English students at the University of Washington asking with genuine concern, 'But I don't understand, Mr. Simon. What is wrong with being average?' There is nothing much wrong with being average, but there is considerably *less* wrong with being above average, and still less with being outstanding."

To put it another way, this time in the words of John D. MacDonald, "In a half-ass world the real achiever is king."

And if you are a motion picture and only average—or as I submit way *below* average where it counts—is there much point in spending $14 million, 16 weeks' production time of uncounted talented artists and technicians who might better spend their time on something outstanding, not to mention the scarce theater booking space and attention of hundreds of thousands of filmgoers who spend millions of dollars for baby sitters, parking, travel costs and the high price of admission, if you are at best only average?

When a manufacturer in this country wants to run a market test on a new product, the city most often selected for the proper demographic sampling, the city considered most *average*, is Columbus, Ohio. The residents of Columbus don't seem to understand how deeply they are being insulted by this "honor." They don't seem to realize that in the name of having the latest Arby's sandwich or sanitary napkin or fruit juice combo tested on them, they are categorized as *average*. And in these days of trying to please the lowest possible common denominator, average becomes synonymous with *mediocre*. Unexcelling. Middle. Undistinguished. Non-idiosyncratic. Predictable. Malleable. Columbus and all its inhabitants become merely marketing tools, fit for nothing better than consuming useless products. This is not the deification of taste, it is the standardization of no taste whatever.

Now to link average with Hyam's one-liner to the heads of the Ladd Company and Warner Bros. Sidetrack now concluding.

On a specific date now lost to historians, in 1966, long after I'd given up hope that *Star Trek* would be the realized dream I'd been gulled into believing it would be, but before my own segment had been aired, a writer who had just sold the series a teleplay, encountered me at a Writers Guild meeting. My own script for "City on the Edge of Forever" had been circulated to a number of first-time or potential writers shooting for berths on the series, so he knew I was considered to have "a beat" on what they wanted. He desired to let me know he's sold the show, and in some small

Outland: Isn't there a brave soul among these hearty space pioneers who will come to the aid of Marshal O'Neil?

way, I suppose, sought my approbation.

He said to me, "I just sold them a script. Guess what it is?" I smiled and said I had no idea, why didn't he tell me. And with absolute innocence he said, "I just took the plot of *Flight of the Phoenix* and rewrote it with Spock instead of Jimmy Stewart."

Though personally I have affection for this man, I was unable to keep myself from turning away from him in disgust. I remember the instant with clarity and pain. My lips skinned back over my teeth like a wolf's. I didn't have the reason or the heart to express my loathing of what he had done. He had taken that which had been done better, earlier, as a feature film, and cribbed from his fellow writer. He had debased the craft and his own talent, high or low, and sold derivative material. For a buck, no more than that, he had performed that cliche act best typified by the back cover ad *Galaxy Magazine* ran in its earliest days: he had converted a non-SF story into a kind of witless space opera by changing the equivalent of *cayuses* to *spaceships.*

It perfectly captured for me, in that awful instant, how writers in Hollywood willingly debase and rupture their abilities in the headlong rush to pander to the illiteracy of producers.

I've never mentioned how I felt to that writer, and we are friends. But I will never have respect for him as an artist.

Peter Hyams stood in front of the deal-makers at the Ladd Company and said, "*Outland* is *High Noon* in outer space," and the wee, limited, horizonless mentalities of those whose purses he wished to wallow in, twitched their noses and once again conceived of the audience as *average* and cut him a contract. They subsidized mediocrity.

But *Outland* is not *High Noon.*

The latter is a film of passion and courage, with a clear subtext that speaks to the fog of fear and cowardice that covered Hollywood during the '50s due to the House UnAmerican Activities Committee witch-hunts that blacklisted, among others, the scenarist of *High Noon*, Carl Foreman. It is the story of a dedicated man doing his job and not being swayed by the self-serving timidity of his community.

The former is a crippled and dishonest mockery of that noble 1952 effort. And the core of corruption that is *Outland*'s most notable feature is redolent of that slavish mockery. More, it is a screenplay that demonstrates Peter Hyams has the plotting sensitivity of a kamikaze pilot with 18 missions to his credit.

Wedded to the bone-stupid idee fixe of transposing *High Noon* one for one, without expanding or restructuring the plot to account for alien conditions and a different societal mesh, Hyams made this film an exercise in repeated inconsistencies, illogicalities and contrivances sufficient to give a coprolite a tic.

Let me enumerate.

PHOTO: MICHAEL J. ELDERMAN

"Writers in Hollywood willingly debase and rupture their abilities to pander to the illiteracy of producers."

In *High Noon* we have a prairie community setting with a population of maybe 200 people, most of whom are farmers and small businessmen and ranchers. They are not gunslingers, they are middle-class burghers and common laborers. It is not surprising, therefore, that Gary Cooper's Marshal would find almost no one to help him. They were people who had relied entirely on the Marshal for peacekeeping, of which there had been no serious necessity in some time as the film begins. It was slow, slumbering town without danger.

Contrast that with the mining colony of Io, where the toughest, burliest laborers in the solar system have come to brave incredible adversity to burn titanium out of a hundred-meter deep crater in airless, high-pressure circumstances. Over 2,100 men, the equivalent of oil riggers and high steel workers and gandydancers. Not cowards, but grizzled roughnecks who work hard, drink hard, and whose lives of confinement would produce not—as Hyams contends—passivity, but a tendency to brawl, to seek hardy entertainments, to get involved in the politics and work-problems of their enclosed society.

In *High Noon* the character of the town is so clearly laid out that we have no difficulty believing the timid mouse-like citizens hide behind their shuttered windows. But in the Con-Amalgamated refinery 27 it is impossible to believe that Marshal O'Niel could not find enough mean, sympathetic, tough hands to make up a cadre of deputies. For God's sake, look at yourself! Are *you* a coward? I'm not, I'd join the cause. And so would you. And so would all those lineal descendants of long-haul truckers, anthracite miners and merchant marine deckhands. It is simply impossible to accept that men recruited and signed to time contracts for their burliness and ability to suffer life under such extreme conditions would *all* be sniveling, head-in-the-sand cowards.

But to maintain with blind illogic that trope of *High Noon*, Hyams defies what we all understand of simple human nature.

Further. Con-Am is government regulated. All through the film O'Niel says they're afraid of losing their franchise, that's why the Earth government has placed Marshals on hand. If the police of any city found they had a serious situation for which they needed more men, they would simply go out and deputize. Conscription. And there are *always* men who sign up for such *posse comitatus.* But not at Con-Am 27 where the moron plot demands that to maintain the *High Noon* parallel, Sean Connery has to go it alone. That is manipulation of reality in deference to the belief that an audience is too stupid to perceive the corruption of real life.

Further. O'Neil acts stupid throughout. If he intercepts the phone conversation between refinery foreman Shep-

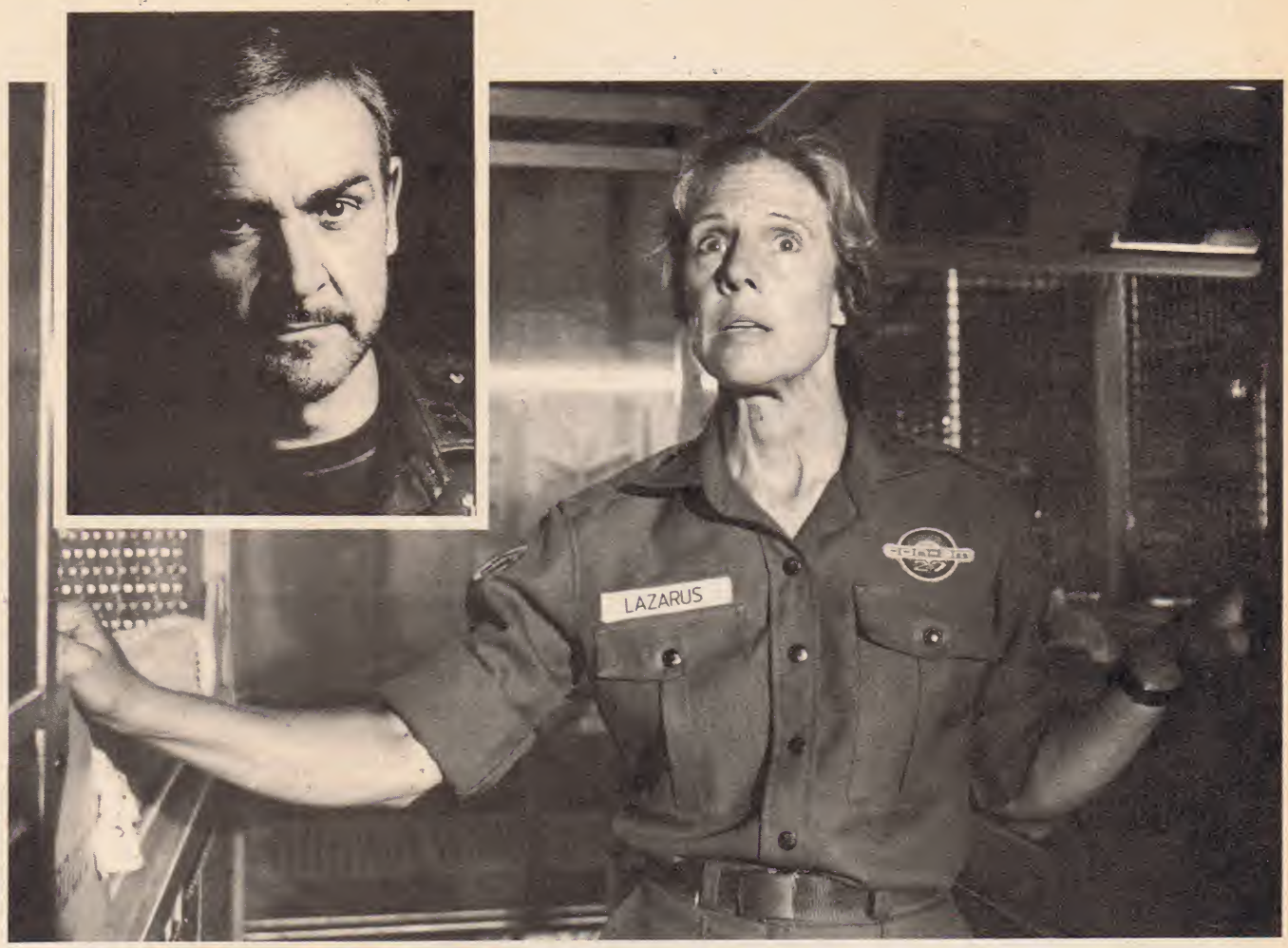


PHOTO © 1981 LADD CO.

Connery (inset) and Sternhagen: Have these two fine actors sold themselves down the tubes in the weak warping of the classic *High Noon*?

pard—the Peter Boyle villain—and the shadowy criminal cartel from whom he's been buying his narcotics, all he has to do is tape the call and then go arrest Sheppard, lock him up till the next shuttle, and send him back for prosecution. But he doesn't tape the conversation, which is solid evidence.

Further. O'Neil knows two gunmen are coming in on the shuttle. Instead of calling the space station and having authorities there check the luggage of all passengers for weapons, thus stopping them at the start, he allows them to board. Or maybe I'm being too picayune. So then, if he isn't a complete asshole, let him stand with his deputies (even the traitor deputy) at the egress port of the shuttle when it arrives. Let him speak to the onboard personnel and have them send out passengers one at a time, have them drop their pants while their baggage is searched, and catch the two "best professional killers in the Solar System" (as the voice on the spacephone called them) before they gain access to a huge refinery complex where they can set up an ambush. And if your deputies say, "We don't want to get involved," then if you are the topkick of the peacekeeping force you simply say, "Your ass is fired, collect your gear." Try and convince me that all these space cops, career men, obviously, will risk loss of pay and being drummed out of the service, because they're afraid to help O'Niel. . . *which is their job*!

Further. If O'Niel has such certain knowledge that Sheppard is the power behind this scam, and if you don't want to acknowledge that all O'Niel has to do is take the fucker into custody till help arrives, then have him simply go to Sheppard's office—as he does on several occasions—tie the clown up and sit there with his laser rifle trained on the port. Have him wait for these two skillful assassins and when they come to check in with their boss, to find out why they can't find O'Niel, let the Marshal blow them out of their socks.

But that's too logical. Too simple. Too direct. It would deny us the joys of that imbecilic chase through the refinery. A chase that defies its *own* internal consistency, not to mention the simple precepts of logic. Let me point out a few to you.

"These guys are the best," said the mysterious criminal voice on the spacephone, when Sheppard called for help. (And do you perceive another lamebrain manipulation of reality in that Sheppard can call for help whenever he needs it, but O'Niel can't? Or won't? Simply put: *he doesn't*, thereby making him seem even more a dolt, rather than the superior cop we're asked to believe he is.) These heavy duty killers come fully equipped with laser rifles that sport heat-seeking telescopic sights. We are treated to shot after shot of these infrared heat-seeking devices tracking back and forth. But each time they get O'Niel in their sights, with him unaward of the danger, *they miss the first shot*! Every single time. Thereby giving O'Niel a chance to escape, to fire back, to pull a diversion-

ary maneuver. What science, what technology, what skilled trackers! What horse cookies!

If these are the two best assassins the crime syndicate and Sheppard can come up with, I'll throw any two of the punchiest button-men in Booklyn against them and relax.

And for a big finale, for the towering moment of absolute idiocy, Hyams asks us to believe that these killers who are "the best," who apparently have been out in space a long time, who understand the laws of physics (which is more than can be said for Hyams), are simple-minded and/or distracted enough to fire a laserblast at a greenhouse window, thus exploding them out into the vacuum.

The night I saw the film, the audience boo'ed and hissed at this ridiculous climax. I was pleased to see that not even an audience slavering to enjoy one of these "sci-fi flicks" for special effects was prepared to let themselves be so intellectually insulted. I wish Mr. Hyams had been there. And I wish I had the spoiled fruit concession.

I've spent about 5,000 words in two columns stripping this gawdawfulness to the rotten core, and I could go on for another 5,000. The phony scare technique of having a cat jump out at Frances Sternhagen. The avoidance of common sense in O'Niel's being able to tap Sheppard's line but in not putting a recorder on the wire so he could find out who the traitor in his midst might be. And the big moral chuck of not having O'Niel simply walk into that dining bay and say, "Okay, you hundred working stiffs, you're all deputized, let's go get the Bad Guys!"

Further. Where is the labor union for these workers? Don't tell me that the United Mine Workers or the Teamsters or the futuristic equivalent of an AFL-CIO wouldn't have shop stewards there protecting the right of the men. Don't tell me that in that vast body of over 2,000 men there wasn't *one* like Victor Riesel, the columnist who had acid thrown in his face for trying to expose union corruption. Don't tell me that there wasn't *one* union man who would see his fellows were being killed by contraband junk proffered by a company man, who wouldn't spread the word and organize other workers. And what kind of schmucks are these 2,000+ workers supposed to be, that they can see others of their number running amuck and dying from some nasty substance, who don't blow the whistle? Even in wholly owned company towns the miners and factory workers stand up for their rights. To ignore that entire aspect of the situation denies the realities of the Labor Movement for the past 100 years. Only in the incomplete, manipulate-as-you-will duplicity of a bad writer can such factors be eschewed.

High Noon was about something special. Like Arthur Miller's *The Crucible* it

PHOTO: MICHAEL J. ELDERMAN

"Outland is the bastardization of someone else's original idea, translated to a genre where it does not work."

was about being a "good German," about letting the powers of repression and censorship and evil do their dirty-work unhampered. It might be shown today as a warning against the New Puritanism of the Moral Majority.

Outland is about nothing. It is simply a cheap filmic device to give the makers of little plastic models a chance to convince you your sense of wonder has atrophied. It is an untalented man's career getting another boost from your innocent desire to see a good science fiction film. It is the bastardization of someone else's original idea, ineptly translated to a genre where it does not work.

In an issue of STARLOG just about the time the film was released, Frances Sternhagen said in her interview, "This isn't really science fiction. It is set in a science fiction ambiance, but is more like an old Western. It just happens to be an old Western on a satellite of Jupiter."

And *that* is the most corrupt thing about *Outland*.

Thirty years after *Galaxy Magazine* conceived the perfect example of what SF would look like if it were put in the hands of dabblers, fools and perverters... the template becomes a nasty reality. It is called *Outland*.

Ms. Sternhagen, an intelligent actress who, in this case, has made an incredibly dumb statement, does not seem to perceive the invidiousness of her comparison. I won't comment on how Ms. Sternhagen—most recently on Broadway in Strindberg's *The Father*—would look on such a transposition of the classics. "Oh, it's just *Miss Julie* rewritten as a superhero comic." "Oh, it's just *Richard III* as a roller disco comedy." "Oh, it's just *An Enemy of the People* as an underwater ballet for Esther Williams."

But the inept and inappropriate warping of *High Noon* into a genre where it doesn't work bothers her not in the least.

Such tenebrous thinking from a respected artist only serves to validate for the jimooks who made *Outland* their arrogant stupidity in cobbling up such a piece of duplicity.

Why do I tell you all this?

Because every time you spend your money to swell the box office coffers for monkey-puke like this movie, you encourage the know-nothings at outfits like Warner Bros. and the Ladd Company to listen to babble like "This is *High Noon* in outer space," and to foist off on you again and again the most slovenly, childish, unsatisfying imitations of thoughtful SF they can get away with.

But then, I suppose if you enjoy playing the boob, you'll fight with me over nits in this analysis... and queue up for the next dreg a halfwit has sold to other halfwits.

In which case, as Jefferson said in another context, you'll be getting exactly what you deserve.

EDITOR'S NOTE: Mr. Ellison has been given a free hand to express his opinions. If you don't like what he says, it's not our fault. If you really love his column, we'll take full responsibility. Publishing is funny like that. *The content is copyrighted © 1981 by The Kilimanjaro Corporation.*

ESCAPE FROM NEW YORK

By ED NAHA

This past summer, amid a sea of mega-buck epics such as *Superman II* and *For Your Eyes Only* and such pro-heroic adventures as *Outland, Clash of the Titans, Raiders of the Lost Ark* and *Dragonslayer*, director John Carpenter did something very daring. He unleashed a modestly budgeted, gritty exercise in quirky futuristic adventure called *Escape from New York*.

Unlike its cinematic peers, *Escape from New York* presents a fairly bizarre approach to patriotism, heroism, romanticism and several other "isms" regularly honored in traditional adventure productions. Set in 1997 when New York is a maximum security prison totally isolated from the rest of the state and teeming with the dregs of society, the film recounts the efforts of one Snake Plissken, a World War III veteran-turned-criminal, in a gun-to-the-head exercise in heroics.

The President's plane has crashed within the prison's grounds and Snake is ordered to rescue him. Since he was scheduled to enter New York as a con anyway, Snake doesn't have too much to lose. If he's successful he'll be set free. If he fails, the ultra-militaristic U.S. Police Force, led by Hauk (Lee Van Cleef), will assassinate him.

When released, the film stirred up quite a bit of controversy. This was not the ultra-positive future treasured by many science fiction cinemaphiles. Yet, according to the film's star, Kurt (Snake) Russell, Carpenter's vision of the future was not meant to be overtly dystopian at all. "John likes to refer to it as his science fiction *comedy*," he says.

Russell is sitting in a New York hotel room, surrounded by his wife Season Hubley (who plays a self-described "crime groupie" in the film), his toddling son Boston and ever-present dog Lambchop. Russell is quick to define what might become one of the most misunderstood SF genre films in quite some time.

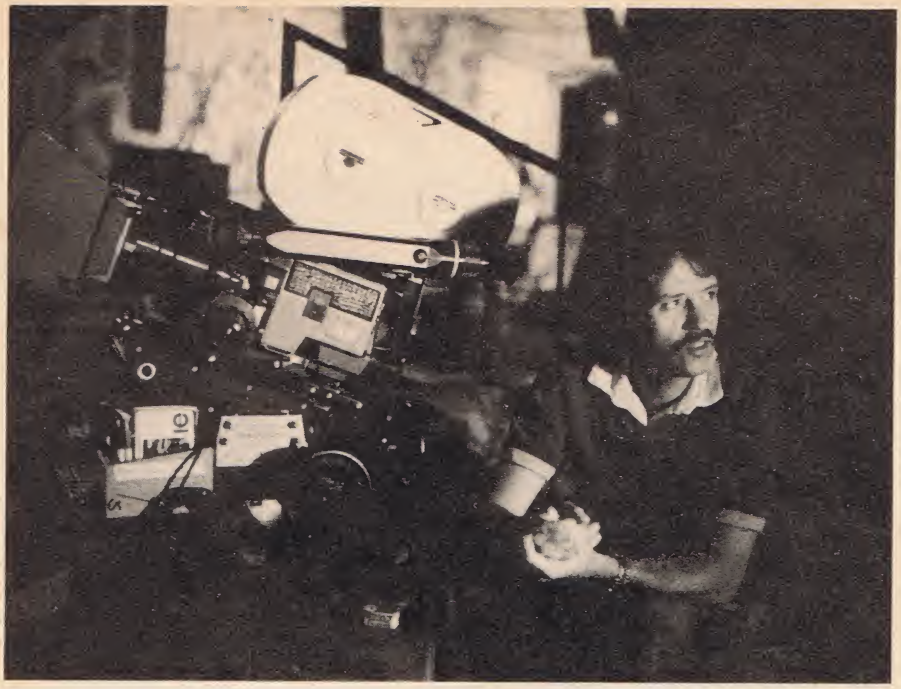
PHOTOS: © 1981 AVCO EMBASSY PICTURES

Kurt Russell as "Snake" Plissken, the ultimate in antiheros, who is forced to rescue the President from New York City.

"I feel that the movie has a lot of humor in it," he continues. "It's high camp but never tongue-in-cheek. I mean, think of it. New York as a prison. It's a semi-realistic concept to begin with. Sure, it *could* happen, but come on, now. It's as broad a film as *On the Beach*. Look at that movie. They're talking about the end of the world yet it was done in a manner that was only semi-realistic, very broad, very distinct.

"*Escape* was the same idea. It was an exaggerated 'what if' movie. What if the crime rate keeps going up? What if prisons keep on getting more and more crowded? What if New York goes to seed? There's a real idea in there but it's taken to exaggerated proportions. It's like a good *Heavy Metal* comic book. It's not cartoon time, but it's not *Raging Bull*, either. Everything is larger than life."

Adding to its nightmarish quality, the film has Snake joining forces with a



Director Carpenter, known for his fright films *Halloween* and *The Fog*, first came up with the idea for *Escape* eight years ago, according to Kurt Russell.

group of inmate low-lifes, including gun moll Maggie (Adrienne Barbeau), addle-brained Cabbie (Ernest Borgnine) and wimp Brain (Harry Dean Stanton), in his attempt to rescue the President (Donald Pleasance) from the criminal king of facial ticks, the Duke of New York (Isaac Hayes).

According to Russell, 1981's entry in the Jaded Cinema Hall of Fame got its start quite innocently enough eight years ago, in the head of director and co-author Carpenter. "John didn't actually show me the screenplay until April of last year," he explains. "He just kept it sitting at home all that time. In 1980, however, he was involved in a film called *The Prometheus Project* which was in the process of falling apart. I don't think he wanted to really do it, anyway. My brother-in-law, Larry Franco, who co-produced *Escape*, told me about this futuristic movie John had been talking about and added that John wanted me to play a guy named Snake. I wanted to read the script right away.

"John didn't want to show it to me because he'd written it back in 1973. He wanted to re-write it first. He finally let me see it. I thought it was a lot of fun. I wanted to play Snake."

Russell eases into a chair. "When we started planning the movie, John and I started to work on Snake's character, develop it more.

"First of all, we concluded that he is a very subtly toned guy. He's not a loud person. As we talked about what made Plissken tick we found ourselves coming up with a characterization that was very similar to what Clint Eastwood was doing in the old Sergio Leone "spaghetti Westerns" with Lee Van Cleef." (E.g. *A Fistful of Dollars, For a Few Dollars More* and *The Good, the Bad and the Ugly*; wherein Eastwood portrayed the "man with no name.")

"All of a sudden, it became clear what we should do with the movie. We had Lee Van Cleef as a cop. He was just great in those Westerns. I said, 'Look. Eastwood fits Plissken, so let's have a little fun with it for the people who are aware of the similarities.' Watching *Escape from New York*, in one sense, is like watching Eastwood and Van Cleef square off again; two steely eyed, staring characters. We did all their confrontations with a sense of high camp.

"I think *Escape* has a lot of spaghetti Western feel to it; a real Sergio Leone style. There are a lot of long, lingering looks. Snake, however, is more enigmatic than Leone's 'man with no name.'

"In fact, Snake is much more like Van Cleef was in those movies. He's not a very likable guy. He's not the kind of character who wants to be an anti-hero, he's forced into the role. Not only that, but he doesn't even want to be around people. Plissken disproves the old addage 'no man is an island.' Snake is an island. He would be perfectly happy if he could live alone without having to deal with anybody.

"Yet, I don't think he's insensitive to the needs of others in certain situations. If he was given a choice about helping somebody stay alive or watching him die, most times, I think, he'd take five minutes out of his life to keep the person alive. After that, however, he'd be gone. He wouldn't want a reward. He wouldn't want to talk to them. He's just an ultra-punk. When it comes to socialization, he just doesn't care.

"Snake was being sent to New York as a prisoner, you must remember. He feels that he belongs there. He doesn't care about going. One place is as good as the other. Yet, at one point, when something goes wrong on the mission through no fault of his own and he's threatened by Hauk, he replies, 'How about a little human compassion?'

"He still holds onto the idea that there's hope for humanity, yet he dismisses the concept as being irrelevant to his lifestyle. He's an honest man, in his own way. He's not a bully. He doesn't want to get in anybody's way any more than he wants someone to get in his. He'd like the whole world to just piss off and leave him alone." Russell suddenly laughs. "And *this* is the *hero* of the movie!"

With Carpenter concocting the slightly manic Plissken as a counterpart to the ultra-sheen offered by Superman and Indiana Jones, it was clear that *something* had to be done to lessen the ominous tones of the movie. That something was humor.

"We had a tough time with the humor when we finally started filming," Russell reveals. "We all felt that there were a lot of laughs in this picture. Yet, it's a really *downbeat* concept. We tried to do things larger than life to play off its concept. You have characters called Cabbie, Brain, Duke. I mean, just look at the Brain character. He's a mastermind who is so weak that he'll side with whoever's on top.

"I think the movie's really funny. After seeing it with an audience, though, I was surprised that people didn't laugh as much as I thought they would. They take it all seriously. They look at it and shudder, 'This is really awful. New York City's a prison and the President is trapped in there.' My god! You have Donald Pleasance playing the President. He's British! What we're saying there is that, in the future, you won't even have to be born in the United States to be President. There are a lot of things that can be taken lightly in there.

"Yet, during one screening, I was sitting next to a girl who was about 16 years old and petrified for the whole film. It *is* a suspense movie, but some people get *so* wrapped up in it that they take the gags seriously. I hope they go back to see it a second time for the humor... which is unrelenting, at times.

PHOTOS: © 1981 AVCO EMBASSY PICTURES

Though *Escape from New York* is described by Russell as having glaring bits of humor throughout, here's an example of the seamy reality that Carpenter envisions for the 1997 version of New York City—fast food emporiums and all.

"For instance, when Brain comes out of a door after running down 107 floors of the World Trade Center...jeez! That's funny right there. We all run down 107 flights of stairs and we're hardly winded. Snake's even been shot in the leg with an arrow, yet he makes it. Anyhow, they make it down to the lobby and are confronted by Duke, who's just been double-crossed by Brain. Brain doesn't miss a beat. He smiles and waves. 'Hi. How's it going, Duke?' "

The fact that at least half of the film's audiences miss the inherent humor surprises Russell but doesn't really annoy him.

"I think people are reacting to the movie differently in different parts of the country. City audiences seem to get the laughs. Midwestern audiences and southern audiences see it more as a science fiction drama. I think they all get caught up in it, though. It *looks* real."

Part of the movie's reality lies in the fact that, despite its comic book elements, it was shot on real city streets as opposed to ramshackle futuristic sets, and most of the interiors (1997's Madison Square Garden, New York Public Library, etc) were filmed in real buildings. "Those were no nightmarish sets," Russell states. "That was St. Louis. We just trashed the streets up a bit. It was as spooky as it looked. Have you ever been to St. Louis? Man, after dark, there's no one out there. I can count on one hand the times I saw people on the street after dark who weren't part of the crew."

At times, the reality of the fantasy proved harrowing for Russell. "We had our share of problems," he grins. "We were doing a gladiator sequence where Snake has to fight this maniac in a ring. We were supposed to swing at each other with bats with spikes on the end of them. We had to use *real* bats with *real* spikes. There was no way to get around that. Rubber bats would bend.

"Now, the guy I had to fight was Ox Baker. He was for real, too. He'd never worked in a movie before and he didn't know how to do a 'Hollywood hit.' He was strong as all heck. He's killed three guys in the ring, one of them was his best friend. He's 320 pounds and one of those guys who don't know their own strength.

"Dick Warlock, my stunt man, and I always set things up so that I can do my

From left: Borgnine, Stanton, Barbeau and Russell.

stunts whenever possible. When we got to this scene, there was just no way I *couldn't* get in the ring with Ox. I mean, I had to hold a bat with a spike in it and swing away.

"We worked out all the moves with Ox but he couldn't remember them. While practicing, he drilled two of my stunt guys who were just going over the moves with him. He broke one guy's nose and smashed another one in the middle of the head with a bat. Then we started shooting.

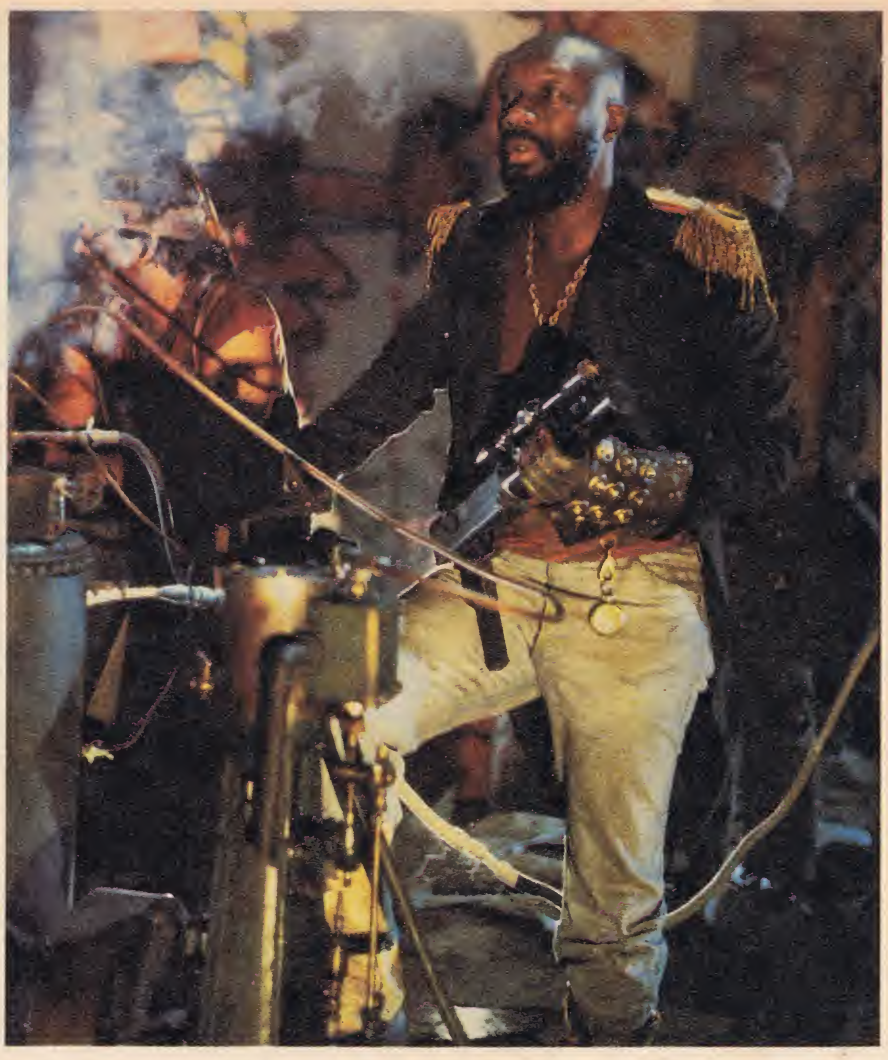
"That day was a nightmare. All I did was swing a bat at this guy and get swung at in return. He threw a trash can in my face about five times. The only thing we got lucky on was a scene wherein we had to connect our spikes. Thank god we got that on the first take. By that point, Ox was getting a little tired and a little bored. He was beginning to swing very wildly. I could have wound up in pretty bad shape."

After three months of filming, Carpenter's black futuristic comedy was wrapped up. A year after production began, it was released nationwide, and audiences were introduced to *Escape*'s sometimes subtle in-jokes. A particularly zomboid character in the film, for instance, is named Romero in honor of the creator of *Night of the Living Dead*, George Romero. A slightly deranged doctor is dubbed Cronenberg; a tribute to *Scanners* director David Cronenberg. Cannibalistic hordes reside exclusively in the rotted New York city subway system and Broadway is still the center of theatrical creativity...although the Great White Way circa 1997 is more likely to sport girly productions starring wigged-out cons in drag.

"No matter if people take this as an adventure or a comedy," Russell smiles, "they never know what to expect. My wife, Season, appears in a scene with me in a deserted Chock Full O' Nuts. Before she can come on to me, she's sucked through the floorboards by thugs. I loved that.

"In pictures like this, there's always a scene where a girl enters and the audience is saying, 'Okay. Here's the girl who's going to get in all the trouble and this guy's going to wind up saving her for the whole movie.' All of a sudden, though, our girl is gone. Whoosh. From that point on, you just don't trust anybody in this film. Wham! The potential love interest disappears."

Another drawing point in the picture's favor, says Russell, is Plissken himself. "Despite the fact that he's really a cold character, I think audiences like



PHOTOS: © 1981 AVCO EMBASSY PICTURES

Above: Isaac Hayes plays the Duke of New York, leader of the criminal element that holds the President hostage. The Duke has some rather weird characters under his rule, like the gentleman at right.

Hauk (Lee Van Cleef), head of the U.S. Police Force, is confronted by "Snake."

him," he says. "I think most people would *love* to be Snake Plissken if only for a day. They'd like to walk down the street and know that just being who they are, people aren't going to hassle them. They wouldn't go out looking for trouble, but they'd be self-assured enough to know that if trouble came their way, they could handle it. People get off on Snake's 'so what' attitude.

"He isn't a hero but he's not a villain, either. Something happened to Snake when he was fighting World War III in Siberia. Whatever it was must have been ugly. So ugly that it turned him into a near automaton. At the end of the movie, it's very painful for him to crack the tiniest of smiles at a little joke he plays.

"I think people will pick up on his sense of honor. Sure, he's mean but, getting back to his 'human compassion' line to Hauk, I think that's really the bottom line with Snake. He asks for but realizes that there isn't any human compassion. Ultra-punk."

Russell sits in the hotel room, clearly mesmerized by Carpenter's creation. Apparently, so is Carpenter himself. The two are planning at least one sequel feature, detailing the further adventures of Snake. "It might be pretty tough to pull off," Russell says. "We've just left Snake after having blown up the world. That was his intention, anyway. He's just basically said to the powers-that-be, 'Blow it up. I don't care. It's going to happen anyway.' "

As for the future exploits of Plissken, Russell opines: "I'd like to see Snake visit other parts of the world. I'd like to see more of the U.S. too. What's going on in America in 1997? Is it a police state? I'd like to find out more about Snake too. I think what will prove most interesting to future audiences is finding out that Snake is really a psychiatrist's nightmare. He's an island. He's not going to mellow with age. His thought process is simple: survive. Period. Look out for yourself, to hell with the rest of the world. He's the kind of guy who wouldn't give candy to a kid on the street. What makes the kid so special that he deserves the candy, right?"

While Russell is philosophizing on Snake's evil ways, wife Season has taken son Boston out for a stroll through New York's Central Park Zoo. Russell is left alone with his dog at his feet. "You know," he suddenly announces, "I'm really happy. All of this would seem pretty empty without my family around."

The actor backs off from the year 1997 and relaxes. At this point, Plissken would have merely smirked and eaten the dog. In the mind of John Carpenter, such is the stuff dreams are made of.

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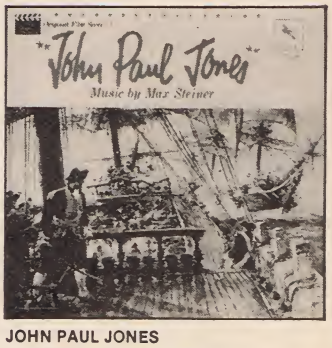

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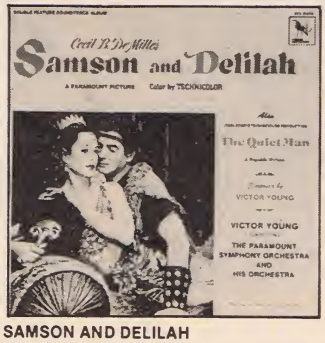

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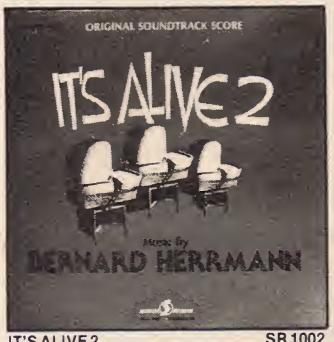

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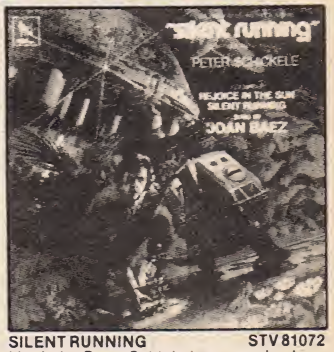

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Russians in Orbit

(continued from page 19)

monauts turned their infrared telescope toward the Moon, darkened by Earth's shadow during a total lunar eclipse, Western wire services related how the Earth-orbiting space station had changed course to allow it to photograph the hidden far side (the "dark side") of the Moon. (It hadn't; the reporters had confused "dark side" with "far side.") Similarly, when a network television news program showed films of a 1975 Soviet space flight while claiming they were current shots of the Salyut-6 mission three years later, the science editor responded to complaints by demanding, "How should I be expected to tell Russian cosmonauts apart?"

No, the facts and figures of this decade's Soviet space spectacular are bound to be mind-boggling enough without the additional garble factor introduced by Western journalism. And the really fascinating side of these space activities will be the human angle, the personal triumphs and tragedies, the practical jokes, the ironies, the disasters. If the past is any indication, this aspect will not easily make itself known to us: official Soviet spokesmen will spare no effort to exploit, distort or hide such events, depending on how the events might affect the image which is projected.

The establishment of a permanent Kosmograd space colony is bound to be an exciting human adventure. There will be cases of unexpected breakthroughs in research; there will be fights among crewmen. Some cosmonauts may come to spend more time in space than they do on Earth—and it may have something to do with their wives or bosses.

The second Soviet woman cosmonaut will go up in this decade, possibly just a few months before the first American woman astronaut. Guest-cosmonaut flights are bound to continue, with representatives from a long string of countries (Sweden, Korea, Palestine, Yugoslavia, Finland, Afghanistan?)—perhaps including a teen-aged Young Pioneer (a Soviet Boy Scout). Along the way, Moscow might decide to send up representatives of non-Slavic Soviet nationalities, such as Lithuanians, Armenians, Kazakhs, Estonians, Azerbaijanis; whether or not they would be *more* politically reliable than East Europeans is a question for the Kremlin to ponder. The most significant guest-cosmonaut flight will be the one on which a second citizen of any of the cooperating nations gets to fly—he (or she) will have to earn that ticket via personal (not political) merit.

More top Soviet space officials will die and thus allow us to learn their names. Authorized biographies of them, as well as of already publicized space officials, such as Glushko and Pilyugin, will provide additional insights—and additional carefully designed deceptions. Perhaps the future will reveal documents that would truly set the record straight on Soviet space history—and the still-missing memoirs of Korolev would be the greatest prize. The Soviet underground press, the *samizdat*, may produce some fascinating items along these lines in the next decade; new defectors will add their own insights.

Other glimpses behind the official Soviet space facade can be provided by the guest cosmonauts. It isn't necessary for one to defect (although that possibility certainly exists and will grow stronger); later participants will be from countries not under Soviet control—and with news agencies not subject to Soviet censorship. They are sure to see and hear a lot of fascinating things during their sojourns in Starry Town.

A higher volume of manned space activities is bound to exact its price; sometime in the 1980s, a breakdown on a Soviet spacecraft may lead to the deaths of its crewmen. Even if not, at least a few emergency landings would be likely; perhaps several days of drama could follow an unexpected splashdown in a distant corner of an ocean. And with a large number of working people permanently in space, the odds go up that one or two will die there, from medical complications or accidents (probably on a spacewalk—one of the most dangerous activities and, as it becomes more commonplace, likely to be conducted with less training, caution and rigid safety standards).

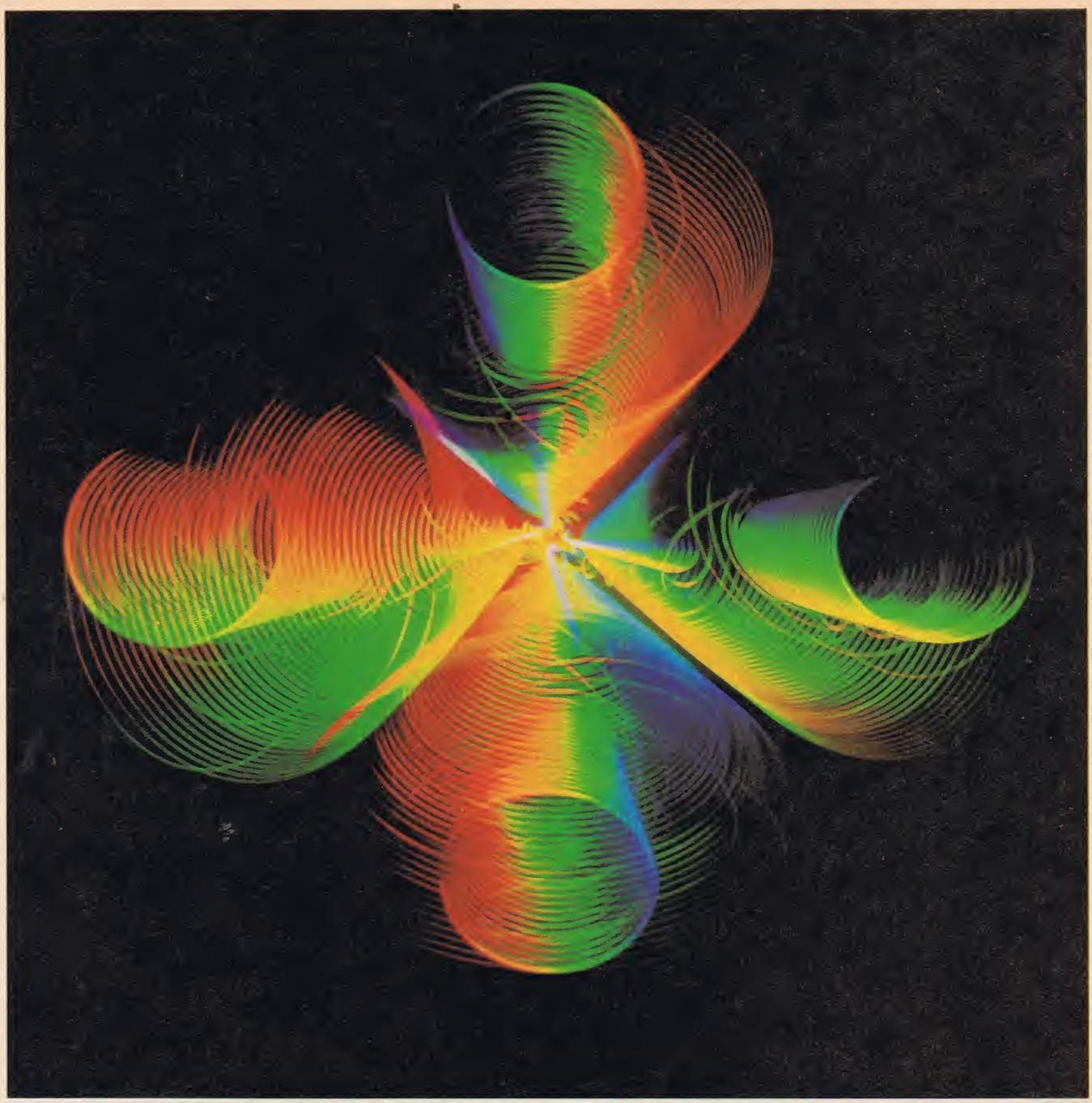
Back on Earth, some of the earlier cosmonauts (and astronauts) will be approaching the age bracket in which actuarial tables predict an increasing frequency of natural deaths. There is every reason, therefore, to expect the 1980s to witness additional cosmonaut funerals—but by then these events may not be earthshaking enough to warrant such high-level honors as interment of ashes in the Kremlin Wall; the nearby Novodevichy Cemetery may have to be sufficiently honorable.

Attitudes of space-farers are also bound to evolve. Space flight will no longer be a once-in-a-lifetime thrill. For many of the space specialists aboard Soviet space stations a decade from now, working in space will be just another technological profession. Even the carefully cultivated hero worship which the Soviet Union wraps around its space conquerors will be lost: future Soviet cosmonauts—by virtue of their sheer numbers—will probably not be known by face to the average Soviet citizens. Such cosmonauts, back from a year-long tour in space, will be able to walk the streets of Moscow unrecognized. And someday the Soviet practice of issuing posters, portrait postcards and authorized inspirational biographies of every cosmonaut will just become too tedious and too uninteresting to the Russian public: outstanding heroes and martyrs will continue to get the publicity, but most working cosmonauts will fade into obscurity. A hint of this may come with the first Soviet manned space shot that does *not* appear on the front page of *Pravda*. (Already a few "routine" launches have been demoted to below the fold.)

Gradually, a few of the more perceptive and adventurous people living on these Soviet space habitats may come to see outer space as their normal environment. The periodic rotations Earthside would be temporary interruptions in an ordinary state of space habitation. Some older cosmonauts may feel this way—and with no dependents on Earth (their children would be grown, their spouses assigned on space stations as well), they could come to accept space as home. In parallel with these conceptual changes, there would be people for whom medical complications (a serious injury, a disease or an unexpectedly severe adaptation to pure weightlessness) will bar the door for any safe return to the crushing gravity of Earth. Such causes could lead to the first true "space colonists"—people who for any number of reasons expect to live out their lives in space.

By the turn of the millennium, there could be a few hundred people distributed among a dozen space outposts (including ships between here and Mars or the asteroids, or Mars and the asteroids themselves). Many of these people will be able to think of themselves as permanent space settlers. They would be the parents of the first babies born in space.

This would all be in fulfillment of the dreams of Tsiolkovskiy a century earlier. The Russians steadfastly believe in that dream and have loyally cherished it; they have worked and sacrificed for it now they are moving to harvest its reality. These accomplishments may be remembered long after the propaganda and political motivations have been forgotten—and in the long run, perhaps that's only fair.



PHOTOS: MICHAEL MANNIGAN

This image illustrates a sequence set to Mussorgsky's "Great Gate of Kiev."

Crystal Odyssey

A Classical Fantasy

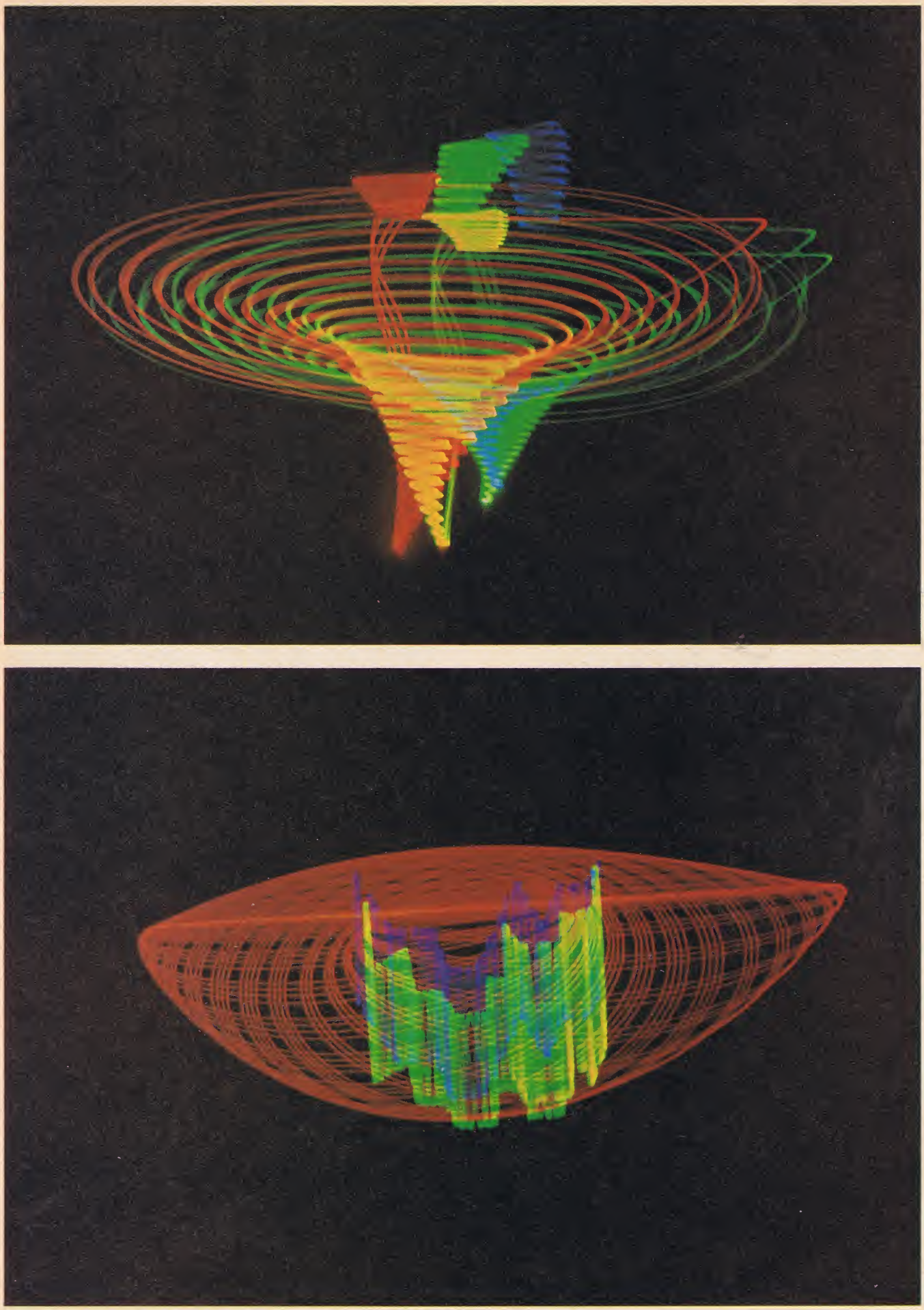
By BARBARA KRASNOFF

"You are about to dream of times and places that never were and yet will always be, and when you wake, you will not be sure which is more real: you, the dreamer, or the world you dreamed."

So begins the exciting new laser light show *Crystal Odyssey—A Classical Fantasy*; a multimedia extravaganza which will take audiences on an imaginery psychic journey into a universe of multihued shapes and weird alien forms.

Specifically, the plot concerns a trip to the planet Chromos, the source of all color. Guided by Phosphor, a native of Chromos, the audience searches for the secrets of the Rainbow Makers, beings that live within a crystal mirror and spread color throughout the universe. But beware! Inside the mirror also lurks the evil Achros, who waits to trap the unwary traveler forever. Will Phosphor—and the audience—escape?

"The audience is part of the drama,"



Top: Image for Ravel's "Bolero." **Bottom:** Image for Grieg's "In the Hall of the Mountain King."

explains Ivan Dryer, creator of *Crystal Odyssey*. "They are accompanying the protagonist, they encounter the antagonist and they are participating in the struggle to free themselves and to become Rainbow Makers."

Eight years ago, Dryer introduced the American public to a revolutionary concept in entertainment: Laserium. Using a krypton laser coupled with a complicated projector, he drew strange and vibrant patterns on the air to the beat of amplified music. Laserium was an instant success; and Dryer's company, Laser Images, Inc., has gone on to produce other laser light shows such as Laserium II, Laserock and Laserium-Starship. But while these programs may have varied in their musical accompaniments, the formula remained essentially the same: a series of abstract laser images with no real focus or theme outside their own innate beauty. Now, Dryer wants to try something different.

"We talked about doing a classical show for many years," he says, "until our programming producer, Gene Partyka, came up with the idea of doing a story in conjunction with the classical music score. So this will be the first Laserium presentation that will have a story line with characters.

"First of all, we had to come up with an acceptable script, which took a good deal of doing. We wanted to convey at least the thread of a story line but not become too wordy, because we're still essentially an abstract kind of show, and we want the audience to participate by way of their imagination. On the other hand, this time we did want to guide them a little bit more as to where their imagination would play, by presenting each one of the musical selections preceded by some narration and interaction between characters that would give at least a sense of drama."

Dryer hopes to add several new factors to his latest production. Prominent among them is a five-watt argon laser for the final sequence—assuming that arrangements can be made for the sophisticated machine. "That's what's holding us up," Dryer admits. "The show has been ready now for several months, but we've been trying very hard to get that power installed and get permission to put it in so we can have the additional laser. If we don't have it, we will cover that loss by having other effects that we haven't used thus far."

Crystal Odyssey will also feature slide projections, flood lights, strobe lights and nine or ten Jacob's Ladders. (The latter should be very familiar to fans of old-time horror movies: they are those V-shaped electrodes that have a steady series of electrical sparks traveling up to the top.) In addition, the audio system will be modified somewhat so that sound can be "panned" to different parts of the planetarium dome.

All these sounds and lights and laser effects will be operated by just one person—the laserist. "We're automating many of the non-laser effects," Dryer explains, "and for the others he will simply press a button to initiate a sequence with, say, strobe lights. We have a total of 16 strobe lights for which there will be different programs; the laserist will press a button to initiate a given program for a particular part of the show."

The music that accompanies the space travelers on their journey through the crystal mirror will not contain the usual hard-rock rhythms, but will range from such classics as Bach's *Grandenburg Concerto No. 3* to Philip Glass' modernistic symphony *Einstein on the Beach*; with selections from such composers as Bartok, Prokofiev, Grieg, Rimsky-Korsakof, Ravel and Vivaldi. Will the same audiences that flocked to laser shows featuring Led Zeppelin and The Who sit still for Bach and Vivaldi?

"We're not going to call it a classical music show. On the other hand, we are sub-titling it *A Classical Fantasy*, and those who wish to make their conclusions from that may do so."

"I guess our main concern all along is whether or not we can convert an essentially rock-oriented audience to classical music," Ivan says. "My sense of that always has been that we can; that in fact these people have been exposed to classical music in various forms and for the most part enjoy it. For example, the score for *Star Wars*—that's not great classical music that will live forever (unless, of course, the *Star Wars* series goes on forever), but it certainly is classical in form and execution, performed by a symphony orchestra and composed by the conductor of the Boston Pops. So it has the right credentials and people of all ages loved it, including rock-oriented audiences.

"We're not going to call it a classical music show. On the other hand, we are sub-titling it *A Classical Fantasy*, and those who wish to make their conclusions from that may do so. We don't want to turn them off in advance. But I think that they're not going to be turned off. I think they'll enjoy it very much."

In fact, in anticipation of the popularity of *Crystal Odyssey*, negotiations are now going through for a soundtrack record album which will include the complete music and narration from the program. "It's amazing how difficult it is to put together an anthology of music like this," Ivan comments amusedly. "Even if, as it turns out, almost all the artists are on the same label. Even they have a hard time getting the Philadelphia to appear on the same record with the New York Philharmonic. I think we had a much easier time securing rights for the rock music, curiously enough, than we did for classical music."

In addition to the upcoming record, Dryer is making plans for an outdoor music/laser concert similar to those that took place a couple of years ago featuring music from *Star Wars* and *Close Encounters of the Third Kind*. "In that connection," he says, "we are negotiating with the New York Philharmonic to do a program in Central Park of music from *Crystal Odyssey* with outdoor lasers in conjunction with our opening in New York. If we can work out the timing of that, it will set a precedent for similar concerts with major orchestras around the country, even in locations where *Crystal Odyssey*, the show, will not be playing."

Crystal Odyssey—A Classical Fantasy is expected to open sometime late this summer in Los Angeles' Griffin Observatory and immediately thereafter in New York's Hayden Planetarium. Soon after that, it will appear at other planetariums around the U.S. that have featured Laserium programs.

It's been a long and expensive road for Ivan Dryer and the Laser images crew—*Crystal Odyssey* has now been some two years in the making, and the new argon laser projector alone is adding $30-40 thousand to their budget. However, Dryer firmly believes that it will all be worth it.

"I think it's going to carry the art of laser entertainment into another dimension that it hasn't had before," he asserts. "And of course we're taking a risk in doing it. But then, we took a risk when we opened the first Laserium show, and everyone said that there was no market for abstract entertainment. And now they're telling us that there is no market for classical music in abstract entertainment, at least not for a mass audience, and I think there is. So we're going to set out to prove that."

Botany: A New Social Science?

The normal view of a botanist is that of a nice, quiet scientist in a clean white jacket tucked benignly in a laboratory and pouring over the anatomy of plants. Not a terribly exciting occupation, and certainly one that wouldn't seem to have Earth-shaking potential in solving the problems of the world. Well, look again at yet another example of how the scientist's knowledge is being tapped to construct a better tomorrow.

The place is the New York Botanical Garden, known throughout the world as a leading center for plant research, where they have decided to establish three new institutes aimed at solving social and ecological problems. Though this imparts a rather radical new approach to the science of botany, the master plan has been overwhelmingly approved by the institition's board of managers. But not without some debate.

It all began, actually, with the arrival last year of Dr. James M. Hester as the new president. Though ironically enough he had no background in botany (he served as president of New York University for 14 years, and spent the last five years with the UN in Tokyo), he readily recognized that botanists have a responsibility to society. "We have acquired in the botanical world," says Dr. Hester, "a great deal of information about plants that is of potential, practical value to the solution of problems such as hunger, increasing energy sources, dealing with a greater understanding of our ecological problems. What we at the New York Botanical Garden are saying is that if we can get the resources—and that's a very important if—we are willing to provide the mechanism within our organization by which our own scientists can focus their knowledge on very specific, practical problems. We want to give [botanists] the setting in which they can apply their knowledge more effectively, in concert with people from other disciplines. In a way, we are establishing a linkage between the botanical world and the world of applied science."

The first step Dr. Hester took was to organize a meeting, held last November, to discuss the role of botanists as social policy contributors. The keynote speaker at the conference was Dr. Rene Dubos, a respected microbiologist and author. In his address to a group of about 25 international scientists, Dr. Dubos argued that botanical gardens should step outside their bounds of simply inventorying, classifying, naming and comparing plant species, and apply their knowledge to the world and its problems.

This idea rattled a number of those present, both positively and negatively. There has been an undercurrent of debate going on within the botanical community recently over whether such a move is desirable. Classicists contend that botanists have their hands full with their present pursuits. Even Dr. Hester, who, incidentally, approves of the new master plan wholeheartedly, concedes that the classification and inventorying of the world's plants is far from complete. But more and more botanists are beginning to see that what they have found out in the plant world can be readily applied to a number of pressing issues—specifically world hunger and energy shortages.

Within a short time after the meeting, staff and managers at the New York institution began discussing the topic. As a result, several committees were formed

PHOTOS COURTESY NEW YORK BOTANICAL GARDEN

The Botanical Garden's Enid A. Haupt Conservatory in the Bronx.

By BOB WOODS

Dr. Ghillean Prance of the Institute of Economic Botany: A future social planner?

to investigate the possibilities of imposing such a master plan. There were committees on science, education, horticulture and public information which all made reports that were circulated to everyone on the staff and board. After additional meetings, the master plan evolved and it was finally approved in June. "The inventorying of the plant world is far from complete," states Dr. Hester, "and all the work having to with plants—conservation, ecology, economic botany, agriculture—is dependent upon the completion of that work. And by no means are we planning to give up that work. What we are saying is that as an institution located in New York City in 1981 we are making an institutional commitment that we will assist those of our scientists who have these inclinations to make a more specific contribution."

The master plan calls for the establishment of three new institutes. The Institute of Ecology will concentrate on the growing problem of environmental deterioration. Scientists will monitor the dynamics of ecosystems and how they interact with one another. This knowledge will be passed on in the form of reports to hopefully stave off further ecological disasters. A major emphasis at first is on the Northeast since much of the Botanical Garden's work takes place in this region.

An Institute of Economic Botany will be set up to explore how little-known food plants can be utilized as major agricultural crops. At present there are only about 20 plants used as food sources, and the new institute would try to increase that number.

Finally, an Institute of Urban Horticulture would address problems specific to urban areas, such as the effects of disease and pollution on plants. The institute would involve horticulturists, landscape architects, urban planners and others in trying to identify new plants and new concepts for plants in urban areas. For instance, there are plants from other parts of the world that have never been introduced here and that might prove to be beneficial. The Botanical Garden is already experimenting with plants from temperate China and the Soviet Union. "Plants like this," says Dr. Hester, "may prove to be more effective, more useful and more beautiful than species we are now using. And we hope to go beyond that and experiment with new ways of growing plants, both indoors and outdoors, and new uses of plants to increase the quality of life."

To date, various palm varieties are being studied for their usefulness as both energy and food sources. Dr. Hester said that there is even some genetic engineering creeping its way into their work. "What everybody is looking for," he says, "is a [plant] that will grow on marginal soil and produce energy so you won't be competing with soil used to produce food crops." Which is the case with the production of gasohol; valuable land that might otherwise be farmed for agricultural crops is being used to grow gasohol-producing plants.

Dr. Hester hopes to have the first of the new institutes in operation by the end of next year, with the opening of the others to follow soon after. But it depends on that big "if" factor mentioned earlier. Efforts are now being made to derive funds from private sources, and since the announcement of the master plan was made, the response has been very promising, according to Dr. Hester. "I think we can increase public appreciation of botany," he says with confidence, "by pointing out, through these institutions we have created the value of this work."

In Print

(continued from page 21)

Phoenix is growing in power. The Elite are having increasing difficulty keeping the Bonds and the Fesh under control. All the problems are growing because of the growing repressiveness of the Elite council.

The first book of the trilogy, *Sword of the Lamb,* plays out the first moves. It shows the conversion of one of the Dekoven Woolf sons to the cause of the Phoenix and the salvation of the Bonds and it introduces the other scion to the possibility of doubt about the role and rule of the Elite. It also (and this is the really important stuff) sets up the soap opera-style romance, with all the rewards, frustrations and cliff-hanging will they/won't they machinations you could ever hope for.

Shadow of the Swan, the second book, has Rich, the son first converted to the Phoenix cause, executed by the Elite and made a saint by the Bonds. His execution is quickly followed by his brother's conversion to the Phoenix cause. Then we got some action, a lot of conspiracy, more romance, plots, plunder, degeneracy and corruption. Wonderful stuff.

These things have been packaged to hit the women's romance readers where they live. The books are light on science and heavy on interaction. Don't let that put you staunch SF readers off. These are well-paced, well-written and entirely adequate entertainments. They offer everything the pulps ever did, and you can't ask for much more than that. I'm eagerly waiting for the third and climatic volume, even though I'm sure I know how it'll come out. It's just reading for the fun of it. And, anyway, it's nice that something's going to come along after the end of the world.

• PORTFOLIO •

Ronald F. Hall

A science fiction artist finds his inspiration in Salvador Dali and Alfred Lord Tennyson

By BARBARA KRASNOFF

The art of science fiction and fantasy can take many forms–not all of which are in the shapes of spacecraft and alien planets. A good example of this is the work of this issue's featured Portfolio artist, Ronald F. Hall. Although his imagination encompasses the usual visions of space and our future, it also goes beyond to reach into the innermost workings of the human mind.

Hall, who was born in New York City 35 years ago, doesn't really remember when he first began to think of himself as an artist. "I'll be damned if I know," he admits cheerfully. "It was one of those things where as a kid you start drawing with whatever you can get your hands on. I don't know what my motivation for it was.

"I guess," he continues, "it was the natural way for me to express myself. I was also interested in music, actually, but I wound up choosing art, because the nice thing about art is that you can make mistakes and redo them; while in music, if you make a mistake when you're in a symphony orchestra playing a solo or something, everybody knows about it. In art, you can erase the damn thing and you get an extra shot at it."

Ron, who attended the Rhode Island School of Design, seems to have gotten a great deal of inspiration from the school of surrealistic art. His work teeters on the border between realism and pure fantasy. "There's a small group of artists known as the fantastic artists," he explains, "guys like Escher, Dali, a lot of others. I think the thing is that you're dredging stuff out of the unconscious, almost getting it from the same place that dreams come from. That's powerful stuff. It's something that means a lot, consciously or unconsciously."

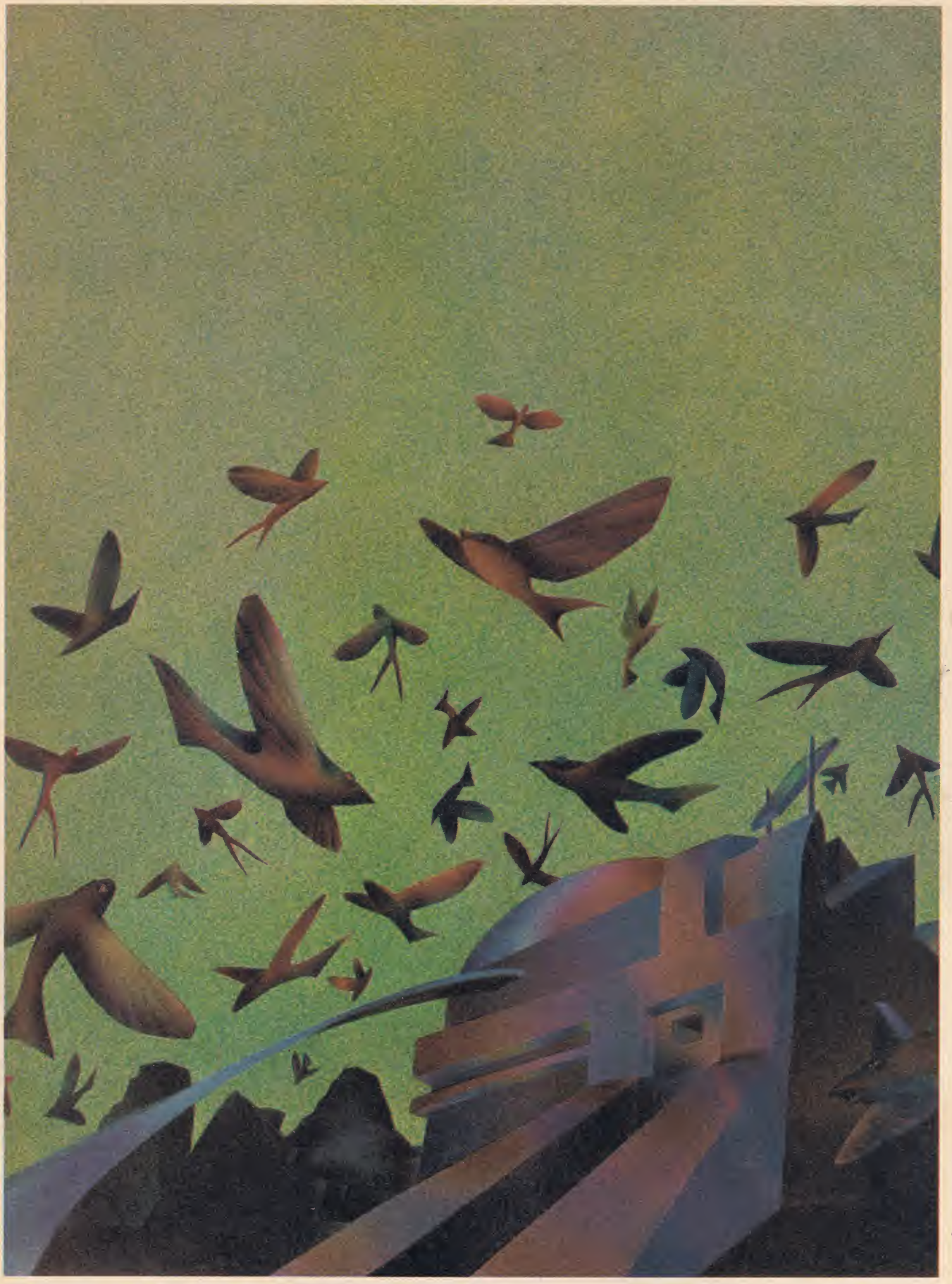
A good illustration of that type of work is the somewhat geometric painting of birds on page 62. "I get a lot of ideas from literature," says Ron. "That one is based on a painting by Alfred Lord Tennyson called "Locksley Hall." It's a poem that deals with, among other things, the march of progress and the evolving sciences. It also has a good deal about his frustrated love life, which I think is the main reason that he wrote this thing, but basically that poem inspired the painting. There's a wonderful section in it about 'The curlews flying about Locksley Hall. . . .' The thing was written in the 1800s, and when he wasn't discussing his frustration in love he was discussing how the thoughts of men are widened by the process of the suns, all

"Eclipse" Hall is delighted by images depicting the irresistible movement of the spheres.

ART © 1981 RONALD F HALL

Top left: "Construction Site" is a hopeful prediction of the immediate future, as astronauts work in an orbital environment. Bottom left: "Photograph" is actually a picture within a picture—a photograph that a spacefarer might take through his viewport of an alien environment.

Above: "Fantasy Composition No. 4" is, according to artist Hall, "some innocent fun with mutated mythological motifs, a bit psychological and a bit psychotic."
Right: In "Metropolis 2000," the immediate future may look clean and modern, but who knows what's happening in the alleys below?



ART © 1981 RONALD F. HALL

"Locksley Hall," based on a Tennyson poem slightly updated and mutated.

"That's basically where this kind of thing is at. Bringing graphic simplicity into a complex universe."

this new business about science and astronomy."

Hall's vision of a realistic Earth caught between segmented planets (page 59) seems to illustrate a different view of the universe. "It's a very dynamic thing that goes back to the French impressionists," he explains. "In their still lifes and their landscapes, they were talking about reducing the world to a series of geometric forms. Very basic forms, too, like the square, the cone, the sphere.... And I think it has a good deal to do with values. It's a statement of simplicity, really. You can take all the complexity of the universe and somehow it helps to give you peace of mind if you can reduce it to some common factors, common denominators. That's basically where this kind of thing is at. Bringing graphic simplicity into a complex universe."

On the other hand, Hall is also capable of the kind of complex vision that is seen across pages 60-61. "That's the other side of the coin," he says, "the multiform aspect of everything that's going on. Sometimes there's just so much to say that I choose to say it in almost a tapestry kind of affair, with a lot of stuff juxtaposed.

"That work was done a while ago. I didn't know about gene-splicing then, but I was interested in mutations and custom creations; different kinds of organs to suit different kinds of planetary environments.

"There are a lot of mutations in that painting. That's probably the main theme of the thing. There also are some variations and modifications of a sphinx-like creature which ties it in with Egyptian mythology. In the upper left-hand corner there are flying insects with segmented bodies. Everything in that painting is based on stuff that's real, based on natural animals and insects. It's a study in mutation, almost a genetic thing—gene-splicing."

Since Ron's main interest lies with the field of science fiction, he has also produced more traditional paintings, such as the futuristic cityscape on page 61.

"That's a fairly recent painting," he says, "and I consider that one rather strange myself, because the more I look at it and see what's going down below in the city, it reminds me of a rat race maze. And I'm not sure I even *like* the damn place down there. It looks very antiseptic. I hope it's not going to happen in about 200 years, this huge, all-engulfing, multi-monster metropolis.

"The ship is just one more spaceship. It's impossible not to like it. I'm sure that most science fiction artists have love affairs with ships, rockets, all that kind of thing. I do like the idea of the towers; they're probably something I picked up from Cordwainer Smith. But that town down there, that megalopolis—I hope that isn't a projection of the future."

However, referring to his space scene on page 60, he smiles, "That's something that I *would* like to see in the next 20 to 30 years. Constructing stuff in orbit, space stations.... just the idea of getting some human environment up there, letting people have extended space off the planet."

Ron has been trying very hard to break into the field of science fiction art, but has found it hard going. So, for the past year, "I've been doing a lot of environmental art, in the sense of art that explores our relationship with town, country, what we are and where we are; having to do with how we behave and how we relate to the rest of society. I myself live pretty far out of the urban area and one of my favorite subjects is what happens in cities.

"I think I'll probably be depicting more and more alternate shapes for the future of our society in the sense of designing types of homes for cities. I find myself becoming more and more drawn towards architecture. I'm beginning to find myself exploring more of the architects who influenced our culture, guys like Lloyd Wright. They also had visions for future cities and ways to make life on a crowded planet more bearable. I think if anything I'm probably heading it that direction."

Fad Gadgetry

Onstage, the singer is pulling clumps of hair from his body. First his hand extracts a few from his chest (which already looks seriously depleted), then from his armpits and lastly, inevitably, it moves into the front of his trousers. It's not the obvious pain that's so disconcerting about this self-abusive display—it's more the incongruity of why this boyishly innocent, sweet-faced young man would want to hurt himself in this way, hurling his body about and then plucking it like one of Colonel Sanders' less successful breeding experiments desperately seeking acceptance. But then, there isn't very much about Frank Tovey, a.k.a. Fad Gadget, that conforms to standard expectations.

Out of his asylum-attendant white stage gear, Frank's shyly unassuming manner and styleless mode of dress further accentuate the disparities of his role-playing. With a soft, British-accented voice he describes his movement from the Leeds Polytechnic art college where he studied performance, to a small over-populated London flat, to a dark closet, and later to an unexpected opportunity recording playful, wonderfully idiosyncratic electronic rock records for an off-the-wall, independent British label. The story begins, unsurprisingly somehow, with teenage frustration.

"I don't play any instrument," Frank confesses without shame. "I can't. I tried to play the guitar when I was 14, but I could never get beyond three chords. Everyone else was into *music* and being *musicians*, and that only frustrated me because I knew it was something I could never achieve." Frank's response to this apparent failure was to step around it and work as well as he could outside of his limitations, an approach he's successfully employed a number of times since. "Once I realized I wasn't very good at playing guitar the standard way I tried different ways of doing it, and then tried experimenting with tapes and things. For a while there, I actually thought I'd invented the tape loop (I've since met others who've had the same delusion). Because I couldn't play anything, I was forced to experiment with sound—raiding my mother's kitchen for pots and pans to bang together, or standing my tape recorder on its end to make the motor slow down, things like that. I had absolutely no confidence in my voice, though. I could make music okay because I could cheat, using loops and the like, but as regards my voice I just had no confidence. So I gave up music for a while and decided to concentrate on mime; I suddenly discovered that I could go on stage and express myself in some way or another, without actually using my voice."

Frank spent most of his three-year stay at art school in the bar, mounting some performances and studying mime in his spare time with Lindsay Kemp (who also tutored David Bowie). "I was the only one doing performance in my year, which was great—I had the whole area to myself. As the rest of the school was turning more and more conservative, I went more and more over the top. When I moved down to London after that, I started getting back into music. I had been recording tapes as background for my performances, and soon I realized that the techniques I'd been using in mime—expression through simple gestures—could also be applied to singing. I knew that I didn't need to be able to sing every scale to get a song over. It just didn't matter." In an effort to secure privacy in the crowded council flat he shared with three other people, Frank moved his electric piano into the closet and started making tapes on his cassette recorder. A tape he'd made was played for a friend of a friend, a guy named Daniel Miller, who a few months earlier had successfully released a hilariously deadpanned electronic punk single called "T.V.O.D."/ "Warm Leatherette" on his own label, Mute Records. Frank's "Back to Nature," a gloomy, brooding post-holocaust scenario, and "The Box," a song about claustrophobic frustration, became Mute's second release. This was followed by "Ricky's Hand," a maliciously bouncy rock club hit detailing the odyssey of a severed limb; "Fireside Favorite," deviously made as sickly sweet as possible in an attempt to slip something "slightly deviant" onto the radio; the album *Fireside Favorites* (Mute STUMM-3, available in this country from Jem Records and other importers); and most recently, "Make Room."

Just how did it happen that Frank Tovey, performance artist, metamorphosed into Fad Gadget, one-man synthesizer band? Frank explains, "I gave up performance art when I came to London because I found that it wasn't direct enough. The people who came to those sort of events were a small, clicquish arty kind of crowd. With music, the communication is more direct—you reach a much younger audience, and they don't have as much of a preconception of what you should be." But clearly, from Fad Gadget's determinedly cathartic stage workout, Tovey hasn't entirely forsaken his performance art past. On the contrary, Fad Gadget is if anything a fusion of Tovey's theatrical instincts with his unorthodox approach to the use of sound and rhythm in the rock idiom. It is precisely the utilization of his musical limitations as a method of working, a non-musician's naive approach to music, that lends his work its freshness.

"Synthesizers are just an extension of using tape recorders for me. I know what the notes are, but I don't really know how to play them—I just hit something and if it sounds good I use it. What I tend to do in the studio is mess around until I get something I like, and then put stickers on the notes so I can play it again." What Frank calls "playing the studio" is a favorite pastime—using anything available to generate interesting sounds and then filtering them through recording studio technology in order to fit it into the musical template. It is, however, the literal fusing of his music with the physical dimensions of his body in a performance context that fires Frank's imagination at the moment. "I'm interested in using my body directly to make music. I've already taped microphones to various parts of my body, and then hit myself. I'm always looking for new ways to trigger synthesizers, because I think keyboards restrict you too much. For years I've wanted to use biofeedback, controlling various aspects of the sound by altering my brain waves—slowing my heartbeat to do one thing, changing the rhythm with my

alpha waves, the filtering with my theta waves, etc. It would take a great deal of money for the equipment, and a lot of time to train my body, but eventually I'd like to use myself as the instrument, and just go on stage and play it."

This really is only the beginning of exploring the human body as the ultimate musical instrument—a sort of helical return to something basic with a new technological perspective. It also returns us to the central, introspective concerns of music, and by extension, all forms of expressive art. Each of us has our own way of creating something out of the process of self-revelation. Says a slightly depilated Frank Tovey, "I'm trying to find out who I am by going to various extremes. By being this way on stage, I find that in my everyday life I don't have to be so over-the-top."

PHOTO © 1981 ANTON CORBIJN

Recordings

Synthesizer music devotees will be happy to discover the return of Frenchman Jean-Michel Jarre. Those of you who got worked up over his very successful earlier platters, *Oxygene* and *Equinoxe*, should immediately trot out and add *Magnetic Fields* (Polydor PD-1-6325), his first waxing in two years, to your collection. While I appreciate Jarre's velvety touch with synthesized tonalities, I find that a little of his music goes a long way. His textures range from the lush to the silky to the aqueous, and like someone restricted to a diet of rich food, I feel a craving for something tense or abrasive to provide some contrast. Jarre also tends toward a certain melodic aimlessness, over-reliance on sequencer rhythmic patterns, and a heavy dose of sacharine in his tunes (the last cut, "Magnetic Fields Part 5 (The Last Rumba)" could almost have been the theme song to one of those wretchedly romantic French films like *A Man and a Woman*). Despite all this, I do like this record—however, more as an environmental agent than as a piece of music. It has a definite calming sensation, like the bubbling of a waterfall, that feels soothing against the roughness of my abraded urban sensibilities.

Speaking of urban sensibilities, guitarist/avant-gardist Fred Frith's new album, *Speechless* (Ralph FF-8106, write Ralph Records, 444 Grove Street, San Francisco CA 94102), seems to me very much born of a New York City state of mind. It isn't in a style the LP affects, or a fashion it follows (Frith, late of pioneering bands such as Henry Cow and the Art Bears, could never be accused of doing either), but in the way it blends chaos and order, cacophony and euphonius beauty, street noise and structured music. It very skillfully captures a feeling of urban life, the conflicts and contradictions it embodies and the seductive lure that comes sheathed in ugliness. Frith is aided in assembling his impressionistic montage on side one by members of the excellent Belgian band Etron Fou Leloublan, while the more rhythmic and immediate side two features the rhythm section of one of New York's best bands, Material (Bill Laswell and Fred Maher on bass and drums respectively), and Mars Williams (of the Waitressess and Swollen Monkeys), one of my personal favorite saxophonists. *Speechless* follows Frith's earlier, no less interesting *Gravity* by six months. Such activity by an artist of Frith's caliber should be encouraged by any means at your disposal (money would be okay).

Two of New York's most talented guitarists, Robert Quine (of Richard Hell's Voidoids) and Jody Harris (of the original Contortions and currently the Raybeats) have collaborated on an instrumental LP called *Escape* (Infidelity JMB-236, available through Jem distributors or by mail from: P.O. Box 3208, Grand Central Station, New York NY 10017). While initially a disappointment to me (considering the ability of the players), I find the thing growing on me the more I listen. The problem, I think, lies in its lack of dynamic range and real bite—a surprise, considering Quine's excellent showing in those areas in the past. *Escape* evokes exactly the opposite feeling from its title—confinement. It is like bottled fusion energy, or two flies buzzing insanely in a jar, looping around each other at breakneck speed, rebounding off the glass wall. The rock cliches that Harris and Quine pummel mercilessly are just beaten for a time and somehow never completely vanquished. I'm left feeling like the crowd at a gladitorial contest, denied their satisfaction after giving the thumbs down. I want to see the blood of rock and roll on my hands! A worthy project that I'm convinced is not the best these two guys can do.

QUICKIES: Roger Taylor is the drummer in Queen, a band I lost interest in quite a few years ago after their third album (they haven't had anything to say since). *Fun in Space* (Elektra 5E-522) is his solo debut, and surprisingly, I'm singularly unimpressed with it. There's a pretty good rubber alien on the cover, some good spacey effects on the title song, but otherwise it's rock'n'roll snoozeville. Zach Swagger's "Empty Highways"/"Going, Going, Gone" is one of the best independently produced, experimental singles I've come across in a while. Good sense of atmosphere evoked with tape manipulation, voice and electronics, and even a bit of humor as well. Send some bux to P.O. Box 7332, Arlington VA 22207.

NIKOLA TESLA

The Man Who Turned On The World

By MALCOLM BRENNER

On a bitter night early in January, 1943, a frail old man stared out his New York hotel window at a thunderstorm showering the Hudson River. Turning to his only companion, a young electronics engineer named Kenneth Swezey, he remarked, "I have made better lightning than *that*!" He was right.

Three days later, Nikola Tesla (pronounced *Tesh*-la) was dead. The loss of one of its most brilliant minds made scant impression on a world at war. Thirty-eight years later, the same world has not yet caught up with Tesla's visions of how things are, and his dreams of how they could be. . . .

Tesla was the black sheep of the Electrical Revolution, a loner who didn't fit in a field of science dominated by group research and industrial think-tanks. Edison received credit for the electric light, Bell for the telephone, Marconi for the wireless. Tesla, who developed A.C. induction and synchronous motors, the backbone of many modern-day electrical systems, has too often been dismissed as a crackpot, a hopeless visionary.

Yet, at the peak of his career—the last two decades of the 19th century—Tesla was hailed as a scientist of unprecedented talent. Ninety-three patents bear his name, as do the generators (still operating) he designed to harness Niagra Falls. How did it happen that the man who gave us the induction motor, remote control, flourescent lights, who developed radio circuits before Marconi, predicted electronic television and produced the high-voltage coil that bears his name, died washed-up and declared senile? The story of Nikola Tesla's brilliant but troubled life is a parable of how human society abuses its prophets.

Tesla was born in 1856 in Smiljan, Yugoslavia, child of a minister and a clever but uneducated housewife, to whom he later attributed his phenomenal creativity. A problem child, he was dreamy, shy, left-handed. He feared boogeymen, and showed empathy with birds by trying to fly with an umbrella.

An organic brain disorder made all his senses painfully acute; life impinged on him with the intensity of an acid trip. It was to be his blessing—and his curse. His father hoped his son would enter the ministry, but at an early age the boy showed a penchant for mechanisms. He was sent to a *realgymnasium*, then to the Polytechnical College in Gratz, where he had his first collision with scientific authority.

Watching a demonstration of a Gramme dynamo—a crude D.C. motor that could also work as a generator—Tesla noticed the sparking commutators, and reached a conclusion that was to be the basis of his industrial power system. Was it not possible, he inquired, to do away with the inefficient and failure-prone commutators, and to run the motor on alternating current right off a generator?

His professor scoffed, comparing the idea to perpetual motion. Tesla shut up and put his mind to work.

It was a formidable mind. In it, Tesla could visualize every detail of the machines he would build—sizing and fitting the parts and testing their interaction—with the precision of a computer simulation. He had trouble distinguishing his visions from reality. Sometimes the world seemed to be enveloped in tongues of living flame.

The idea blossomed in 1880, while Tesla was working for the telephone company. One evening, while strolling with a friend, he was reciting stanzas from Goethe's *Faust* when the A.C. motor suddenly loomed, complete in every detail, out of the setting sun.

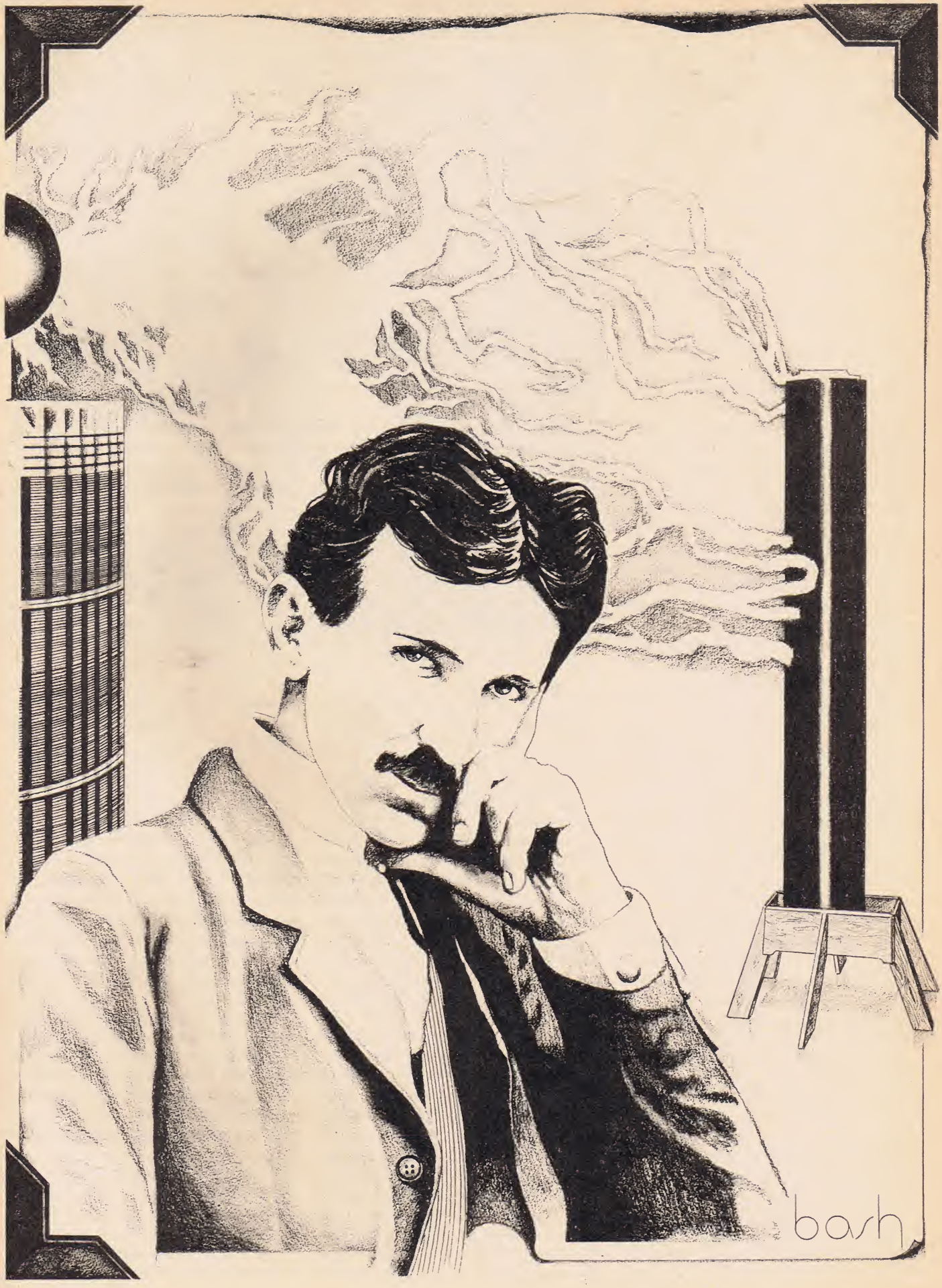
When a loop of conductive wire rotates in a magnetic field, an electrical current is generated which changes direction as the armature sweeps by the opposing magnetic poles—hence the term "alternating" current. "Direct" current, such as is produced by a battery, flows continuously in one direction only—from the negative pole to the positive. A.C. has several remarkable advantages: it can do more work; it produces better light; and, most importantly, its voltage can be stepped up for long-distance transmission with little loss of power.

All generators in Tesla's time physically rotated either the armature or the magnets, and all used commutators to turn A.C., which no one could figure out how to use, to D.C. The commercial power industry was hampered by the sparking problem and reliance on D.C. full stop. Voltages high enough to transmit any distance burned out the commutators. There was no standardization, and distribution was limited to a mere kilometer or so from the powerhouse.

Tesla's innovation was this: *rotate the magnetic field itself*, change its poles from north to south to north again continuously. Two or more fields, slightly out of phase, could drive a motor.

Armed with this insight, Tesla spent every spare franc, deutchmark and zlotny on materials, completing his first prototype in 1880. Conservative European investors were reluctant to gamble on an experiment devised by an eccentric Serbian. When his employer offered him a personal letter of recommendation to travel to the United States and work with Thomas Edison, Tesla leaped at it.

Even before he boarded the boat bound for America he was robbed and



ART: © 1981 KENT BASH

arrived in his strange new home with four cents, plans for a flying machine and the clothes on his back. Impressed by the strange European's brilliance, Edison put him to work in the dynamo factory, promising him a $50,000 bonus. Tesla slaved 18 hours a day, earning Edison's highest praise and $18 a week.

The two men, as it turned out, were utter opposites. Edison was untutored, crude, a practical joker whose approach to invention was totally empirical. Tesla, by contrast, was well-educated, cultured, the consummate theoretician, who spurned even paper and pencil. When a year's hard labor produced two dozen new dynamos for Edison, Tesla went to collect his well-earned reward. "You don't understand the American sense of humor," Edison quipped. Tesla tipped his hat and walked right out.

He spent the next two years digging ditches. But genius will out, and Tesla finally made connections with Edison's arch rival, George Westinghouse. Westinghouse had acquired the rights to an A.C. system developed in England. In Tesla he found the man who could develop it for him. By 1888, Tesla had patented a comprehensive system of A.C. generation and distribution. Lectures at prestigious institutions followed, and almost overnight Tesla was being hailed as a genius. Westinghouse purchased the patent rights for $200,000, to which Tesla added a rider of a dollar per horsepower.

The scientific authorities, among them Siemens, Lord Kelvin and Elihu Thomson, co-founder of General Electric, again scoffed. A.C. was too dangerous, they asserted, thousands would be electrocuted! Asked to develop the electric chair, Edison agreed, providing it was done with "Westinghouse current." The "Battle of the Currents," as the press named it, was joined.

Common to both systems was a reliance on mechanical or combustion energy to drive a generator. There all similarity ended. Tesla's understanding of the "tricks" possible with polyphase alternating currents allowed one form of electricity to perform many different tasks. Generated as two-phase A.C. at 2,200 volts, it was ideal for industrial motors. Stepped up to 11,000 volts and three phases, it could be efficiently transmitted long distances over thin wires. Reduced to single phase, 110 volts, it produced excellent light, and it could be turned into direct current to run streetcars and perform other tasks.

Edison's system, in contrast, would have required massive, multiple lines for each application. The cost of wiring alone would have been astronomical! The laws of physics dictated Tesla would win, but not before Westinghouse was driven to the verge of bankruptcy. In desperation, Tesla reluctantly agreed to give up his rider, throwing away his chance to become a millionaire. A fanatical idealist, he would have sacrificed much more to see his system used.

As his system made news, Tesla's social status rose rapidly. He was introduced to the artistic luminaries of his age. He demanded, and got, the best of everything: a room at the Waldorf, dinner at Delmonico's. Life glittered.

However, his social life was curtailed by a germ phobia that dominated his social life. He washed compulsively, disliked shaking hands and would touch another person's hair only at gunpoint. These eccentricities did not escape the notice of the press.

To demonstrate the safety of alternating currents he began a series of public demonstrations, culminating at the Columbian Exposition in Chicago, 1892. Dressed in a tuxedo and six-inch insulator boots, Tesla would pass a million volts of high-frequency A.C. through his body to light lamps, run motors and perform other electrifying feats, making use of the fact that high frequency voltage travels over the skin, doing no damage. Tesla would be surrounded by an aura of glowing coronal discharge that persisted even after the current was turned off! His audiences were more mystified than educated. Obviously, this mysterious European had rapport with the gods of lightning.

True, in a sense; Tesla never subscribed to electron theory. To him, electricity was a form of life, life being an organized form of electricity. Even the complex interactions of society could be reduced to mathematical formulae, yet the workings of his own mind astonished him. Example: While touring Europe in 1892 he sensed his mother's impending death and rushed to (from Paris) her bedside just in time to say goodbye.

When he told this story, many people were convinced he had supernatural powers. Reporters of the "yellow journalism" school played up these ideas. Occultists were attracted to him, and a cult gradually formed around him, fueled in part by his fearless prophecies of what he would do next.

As a youth, he had dreamed of harnessing the power of the far-away Niagara Falls, and in the mid-'90s the dream came true. Using dynamos and turbines of Tesla's design, Westinghouse turned on three 5,000 horse power generators where 17 other designs had been rejected. This feat made possible two new industries: aluminum refining and the production of carborundum. These led, in turn, to commercial aviation and electronics, which eventually transformed the world.

To produce the ultra-high voltages needed for his experiments, Tesla developed the coil which bears his name. The outer, or primary coil, consists of a few turns of multiple-strand wire; the inner, or secondary coil, contains thousands of turns. When the primary is energized with high-frequency, high-voltage A.C., a rapidly alternating electrostatic field is set up which produces Hertzian waves. The secondary coil, acting like an antenna, steps up the voltage in direct proportion to the ration of turns on the primary to turns on the secondary. With ten coils on the primary and 10,000 on the secondary, a thousand volts travelling in could become a million on the way out. In various forms, Tesla coils are found in all high-voltage devices, the most common of which was Tesla's unachieved dream—television.

He experimented with x-rays and flourescent tubes, which he could light in empty space with powerful electrostatic fields. If current could be thrust through the "ether" to light lamps, what else could it be made to do?

In 1896 Tesla announced the development of a means to transmit intelligence and control objects at a distance. Authoritative journals again reacted with scorn, but a year later he amazed an audience at Madison Square Garden with a demonstration of a "teleautomaton"—a model torpedo boat controlled remotely. A fleet of such inexpensive, unmanned craft, he maintained, would end warfare on the high seas. The U.S. Navy investigated, but never moved on the idea. He further predicted that refinements in this idea would produce programmable automatons capable of following instructions, discriminating right from wrong and learning from their mistakes. This was, of course, scientific heresy. . . .

At times it becomes hard to separate the facts from mythos. His experiments in resonance lead Tesla to claim he could split Earth like an apple by periodically reinforcing the shockwave of a powerful explosion! He was the first scientist to realize that technology was capable of effects on a planetary, even cosmic scale. His ideas lay so far beyond the means of his time that they sounded like fantasy. Unscrupulous reporters did not hesitate to puff "interviews" with him out of their opiated typewriters; they sounded more realistic than the real thing.

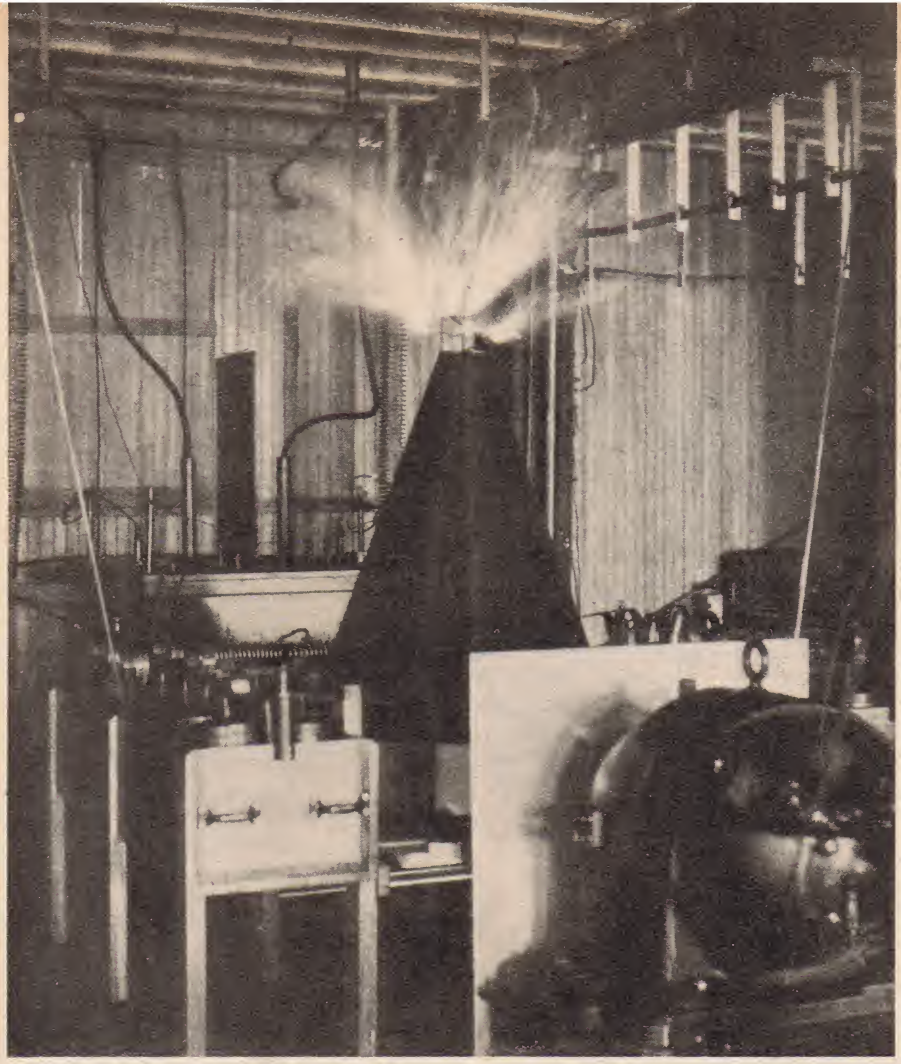


PHOTO COURTESY NY PUBLIC LIBRARY PICTURE COLLECTION

A Tesla Coil from 1895. According to the caption which accompanied the photograph, the streamers at the top were of a purple hue and resembled filaments of seaweed.

At the turn of the century, he was contemplating projects too dangerous for his New York laboratory. He established a temporary laboratory at Colorado Springs, seeking to confirm a bold hunch. A powerful electrical storm on July 3, 1889, gave him the clue he was looking for: the passage of the storm revealed on his instruments the presence of stationary, or "standing" waves in the Earth. Our planet, he surmised, was a perfect conductor of electricity at the right frequency; it could be used as a colossal capacitor, storing a charge in standing waves that could be made available anywhere, without wires.

To confirm this theory, he carried out spectacular experiments. He lit 200 incandescent bulbs 40 kilometers distant without wire, generating manmade lightning flashes 40 meters long. He claimed to have produced ball lightning, and was fond of reading by the light of his spark coils.

It was here, one lonely night, that he made his most controversial discovery. He admitted receiving powerful electrical signals, occurring in a 1-2-3 pattern, originating from the depths of space. At first terrified, Tesla leaped to the conclusion that he had received signals from live forms on Mars.* When he announced this discovery, a storm of scientific protest arose, but Tesla would not be swayed. When he burned out the local generator and lost his free power, he returned to New York to undertake a project that would change the world.

Tesla wrote to his "angel," telegraph magnate J.P. Morgan, that he was contemplating "the transformation of the entire globe into a sentient being... which can feel in all its parts, and through which thought can be flashed as through a brain." He conceived a series of six colossal "magnifying transmitters" which would not only transmit power wirelessly, but interconnect world communications: telegraphy, wrist telephones, television, photojournalism, stock reports, time, secret messages and a forerunner of radar. Like early advocates of nuclear energy, Tesla claimed his power would be too cheap to meter. Therein lay the difficulty in financing this scheme: you couldn't meter it.

(*It today seems more likely that the signals came from Jupiter, a powerful radio emitter.)

Morgan contributed $150,000 to purchase 51 percent of Tesla's patent rights, and he set to work on "Wardenclyffe," as the project was called. At the heart of the scheme was a fantastic tower, 55 meters tall, 20 in diameter, built in Shoreham, Long Island. Dynamos installed underneath would harness the power of a Niagara Falls, and an industrial park employing thousands would spring up around it. His grandiosity, his fearlessness and utter self-assurance were reflected in his articles, which became intensely philosophical and metaphysical. So engrossed was he in his dreams and his work that his patents were pirated left and right.

There were troubles with labor, troubles with equipment, troubles with the stock market, some of them Morgan's doing. Months dragged into years, and J.P. grew impatient but refused to put out any more cash. Tesla begged, pleaded and finally raved, calling Morgan a "monster"—all to no avail. The tower stood completed, a marvel of engineered, but the generators and transmitters were never installed.

This failure broke Tesla spiritually and financially. His bold predictions had alienated him from the scientific community, and he became embroiled in lawsuits. He struck out as an independent consultant, and designed turbines of remarkable power and sizes, large and small. He boldly expounded experiments he could never afford—autopilots, helicopters, supersonic jets, superconductors, geothermal energy—to anyone who would listen. He predicted the ultimate dominance of women and foresaw a future world of ruthless efficiency, where humans would be raised like bees, and recoiled from it.

In 1915, Reuters news service reported the Nobel Prize was to be shared by Edison and Tesla—a sardonic twist of fate that never occurred. The prize was given to the Braggs, pioneers of x-ray crystallography. Tesla was crushed by what was widely seen as an official rebuff of his work.

He was awarded the Edison Medal two years later, and tried to pay his typist with it. The same year, the U.S. Army blew down the Wardenclyffe tower without permission or payment, acting on rumors that it was a base for German spies.

He felt himself fading into scientific obscurity, becoming a relic from another age. He denied the possibility of Moon rockets, and claimed nuclear energy was a farce. Twice the government of the new Soviet Union offered him an

(continued on page 74)

By JACK WILLIAMSON

Born John Stewart Williamson in 1908 in Arizona, author Jack credits his early interest in writing science fiction to the 1927 serialization of A. Merritt's The Moon Pool *in* Amazing Stories. *A year later he published his first piece of fiction, "The Metal Man." By 1940 he had more than a dozen novels published, along with scores of shorter stories, in the SF pulps. It was during this time that he wrote what remains his most famous work, the "Legion of Space" series, comprised of* The Legion of Space, The Cometeers *and* One Against the Legion*; an additional story, "Nowhere Near," appeared in the 1967 edition of* One Against the Legion. *His highly regarded anti-matter series,* Seetee Ship *and* Seetee Shock, *was penned under the name of Will Stewart, but was later reissued under his own name.*

During the '40s and '50s, Williamson collaborated with several of his peers, including James Gunn and Pohl Anderson. In 1960, he began a new career at Eastern New Mexico University, where he taught the modern novel and literary criticism until his retirement in 1977. In 1976, Williamson was awarded the second Grand Master Nubula award, preceded only by Robert A. Heinlein.

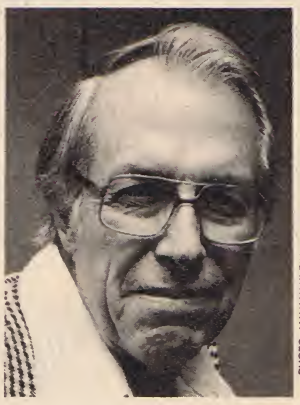


PHOTO: JAY KAY KLEIN

The Scientist, The Humanist, and Us

I want to say something about the scientist and the humanist. I have friends in both camps. I'm afraid they often fail to understand one another. Their philosophies and their programs are often in conflict. That's regrettable, because they're both essential to the integrity and the survival of our civilization.

Since the word humanism has been kicked around pretty roughly, we might comment that the humanities have been identified by act of Congress. The academic humanists include professional scholars in history, literature, philosophy, ethics, comparative religions and other disciplines concerned with what it means to be human.

The word science is also misused, often as a sort of modern synonym for magic. It comes from a root that means to know. We're all born curious, and the pure scientist is the seeker of knowledge for its own sake. Knowledge, of course, is often good for more than itself. Applied science we call technology. In just this century, watching with wonder and sometimes with terror, we have seen the world transformed by the assembly line and the automobile, by the airplane and the nuclear bomb, by radio and television, by vaccines and antibiotics, even by the pill.

The difficulty between the scientist and the humanist rises out of technology. The scientist understands it and tends to approve it as a child of his own. The humanist tends to feel bewildered and afraid, his whole world in danger. The conflict isn't new. Lord Snow discussed it decades ago in his lecture and book on the *Conflict of the Two Cultures*—the culture of science, as he called it, at odds with the transitional literary academic culture.

There's a revealing case history in a new film, *The Day After Trinity*. It was largely funded by the National Endowment for the Humanities, and it recently ran on PBS. It documents the life of Robert Oppenheimer, who headed the Manhattan Project at Los Alamos during World War II. That was the secret military project that developed the atomic bomb. Oppie was a brilliant scientist, and he became a gifted administrator. Without him, the project might have failed.

He was also a humanist. He knew seven languages, and he was a scholar in metaphysical poetry. The film presents his life as a tragic conflict between

"The difficulty between the scientist and the humanist rises out of technology. The scientist understands it and tends to approve it as a child of his own. The humanist tends to feel bewildered and afraid, his whole world is in danger."

ART: © 1981 RON WALOTSKY

"It's ironic that Oppenheimer's science was such a success, his humanism such a failure. He failed to stop the hydrogen bomb, failed in his plea for international control, failed to rescue the world from the threat of nuclear doom."

science and humanism. A tragedy, perhaps, for all mankind.

Certainly, tragic enough for Oppie himself. Appalled by Hiroshima and Nagasaki, he spent the rest of his life as the humanist, trying to undo or atone for what the scientist had done. He tried to stop the effort led by Edward Teller to develop the hydrogen bomb—which is a thousand times more powerful. He worked for international control of atomic knowhow under the United Nations. He shocked many of his fellow scientists by announcing that the physicist had known sin.

It's ironic, I think, that his science was such a blinding success, his humanism such a tragic failure. He failed to stop the hydrogen bomb, failed in his plea for international control, failed to rescue the world from the threat of nuclear doom.

That failure fits the classic pattern of Greek tragedy. Highly honored for a few years, an advisor to presidents, he was accused of disloyalty, tried in secret before the AEC, stripped of his military security clearance, left to die in something near disgrace.

As the film shows his life, he made a Faustian bargain. Dr. Faustus was the legendary German magician who sold his soul to the devil in exchange for knowledge and power. Perhaps Oppenheimer really did come to feel that way about himself and the bomb. I don't know. But I would like to suggest that his life is only one incident in an older and more general human drama.

The tree of knowledge that grew in the garden of Eden is a symbolic summary of it. In the Bible story, Adam and Eve suffer the kind of tragic fall that Oppie did. Yet I think—at least I hope—that our racial drama need not end in total tragedy. Our predicament is dangerous, certainly, but not certainly fatal.

Reasoning from analogy is dangerous. Analogies seldom reveal any better information than we put into them. Yet there's one that tempts me. I would like to compare our situation now with an early event in the evolution of life on Earth.

The simplest life-forms are single cells. They probably evolved in warm shallow water. In that environment, they had freedom to move—so long as they stayed in warm, friendly water. To get out, they had to succeed in a complex series of evolutionary jumps.

They had to unite into many-celled organisms, such as finally evolved into us. They had to give up certain individual freedoms. They had to master special functions and learn to communicate with one another. They had to accept systems of central control. In return for all those concessions, they gained new dimensions of freedom and power on dry land.

It's interesting, I think, to look at human history by analogy as another such evolutionary jump. Beginning perhaps a million years ago with the invention of language. Continued, ever since, with social changes that join more and more of us into ever larger groups, that require each of us to become more highly specialized in what we know and what we do, that require us to accept increasing social controls, often at the cost of certain primitive liberties.

For a million years or more, the change was too slow to see. In our century, it has become explosive. The cause, of course, is the invention of new technologies. Most recently, those in the electronic media. The telegraph and the telephone, the motion picture, radio and TV, now the computer.

These innovations are not only changing our lives, but they're rewriting the old rules of evolution. The strivers for survival used to be individuals. That's no longer so. The game has changed. We're playing as groups: as unions and parties and nations. Always larger groups, always fused more closely with our new electronic nerves.

A critical turning point will come when the whole world must accept itself as a single unit. A failure then could mean the extinction of the race. That danger strikes me as the best logical argument for a migration into space. Colonists in space might survive to repeople Earth.

That's still science fiction. Getting back to Oppie and his sense of sin, I think he blamed himself too much. If there was a sin, it wasn't in putting the bomb together. It was the invention of language. Nuclear weapons are terrible enough, but knowledge of the atom is only one of the Eden fruits that human nature—human progress—is requiring us to pick. If not Oppie, it would have been somebody else.

Other fruits are hanging there, offering all of us the same Faustian choices of knowledge and power, always with potential penalties. Look at genetic engineering. It already enables us to create

new kinds of life. It promises new sorts of magic to save human lives. It's also at least conceivable, if not very likely, that a genetic engineer might invent a new virus that would end all human life.

Yet we can't turn back the clock. New technologies are seldom uninvented. If nuclear proliferation is a deadly problem, genetic proliferation could be equally deadly—and even harder to stop. Genetic knowhow is already widespread. The lab equipment is relatively simple and cheap. Up to now, the most essential raw material has been the colon bacteria that every researcher carries in his own gut.

Or look at the computer. Computer centers are already counting us, collecting our taxes, writing our Social Security and welfare checks. They're sorting our names and orchestrating our political campaigns and predicting who we'll elect before we vote. They're operating robots that build automobiles and explore other planets and deliver nuclear warheads.

Concede that computers can already solve problems a human being can't, and think a million times faster. Recall that they have been evolving only maybe 30 years. Project that evolution for another 30, another 300.

Computer technology—like nuclear technology and genetic technology—is going to change the old rules of life. Some of them, once vital to survival, are hazards now. To cite the example of the film, Oppenheimer made the bomb to defend freedom and left all of our lives in danger.

I'm not certain what the new rules will be. I am sure, however, that they'll be challenged bitterly. For possible examples, I doubt that they'll allow private handguns or national nuclear weapons. Pretty clearly, in spite of the pro-life people, they will have to limit populations. I believe, by the way, that the Japanese and the Chinese are accepting them a little more willingly than we are.

I doubt, however, that free nations will be allowed much longer. To return to the biological analogy, I imagine that the evolutionary jump is one that the whole world must make. Or fail to make. The survivors of a failure, if any, might find themselves back in a stone age—with the game gone and the jungles all polluted.

But I'm an optimist. To me, this is an exciting time to be alive. Though I suppose every historic age seems unique at the time, I can't help feeling that we're living on top of something like a volcanic eruption—that we're privileged to have grandstand seats at a great turning point in human history. A dangerous time, but also exhilarating.

If we're really climbing out of another ocean, to explore a higher shore, I'm eager to see it.

To get there safely, I think we have to understand the new rules we're writing and make the best of them. The scientist, as the instrument of change, will have to be more and more concerned about the social consequences of what he does, but he needs all the help he can get from the humanist. I like to think of the humanist as the chief custodian of human values; with values changing, he needs to understand the change and guide it to preserve the best of the great legacy we call civilization.

We all need a long step forward in awareness.

Science is too important to be left to the scientists. The human future is too important to be left to the humanists. In fact, the traditional lines between the disciplines are already dissolving, as they dissolved for Oppenheimer.

The scientist is learning what we're made of—solving the Chinese box puzzle of particles hidden inside of atomic particles, down to the level of the quark. He's looking out in space and back in time, toward the limits of the universe and the Big Bang that seems to have begun it. He's breaking the genetic code, learning how to rewrite the genetic programs that shape us. He's discovering what we are, who we are, at least in a sense why we are.

All that, of course, is the traditional territory of the humanist. I think the humanist ought to welcome him, and even borrow something from him. That's his habit of challenging innovation, not with dogma, but with a flexible scepticism, a willingness to welcome new ways of thought as they prove themselves.

We can't afford to leave the future to either one, but rather we must take lessons from both. So far as we can, with open minds and without despair, we must learn to respect the methods and the findings of the scientist and the values and concerns of the humanist.

We can't afford to drown before we reach that new shore. Understanding and adapting, we can get there. Our human future can be both humane and magnificent.

"A critical turning point will come when the whole world must accept itself as a single unit. A failure then could mean the extinction of the race. That strikes me as the best logical argument for a migration into space."

Tesla

(continued from page 69)

exalted research position, but he would not turn his back on America.

In the mid-'20s, and again ten years later, rumors circulated of a revolutionary "death ray," with credit for its creation usually given to Tesla. In a puzzling article Tesla wrote for *Harper's Bazaar* he described his invention as a "wall of power" that could destroy 10,000 airplanes 300 kilometers away. Some have speculated that Tesla had dreamed up the laser, but he made clear that "rays" of any kind were useless for warfare. The invention could only be used for defensive purposes; he would reveal it only to the Geneva Convention. Needless to say, no one was interested, and we have no idea what precisely Tesla was talking about, even today.

The year 1935 saw the celebration of his 75th birthday, organized by Kenneth Swezey, his only close friend. Engineers and physicists from all over the world paid their long-overdue homage. Tesla even made the cover of *Time*, declaring inside that nothing could be more important than interplanetary communication, which would revolutionize humanity. Still in financial straits, he had to change hotels to avoid paying a $3,000 overdue bill.

Two years later he was struck by a car, and never recovered. Somebody bumped the camera at his funeral, and the blurry image led occultists to say that a mysterious force emanated from his coffin. His scanty notes now reside in a museum in Yugoslavia, attracting international scientists.

In concrete terms, Tesla probably gave the world more, and received less for it, than any other scientist. Hugo Gernsback, founder of *Amazing Stories*, called him "the world's greatest inventor... his discoveries have no equal in the intellectual world." As it is, we have accomplished many of his dreams— not in the elegant, unified way he planned, but piecemeal: comsats, microwaves, pocket phones, robots, cruise missiles, interplanetary communications equipment. There is some question as to whether his wireless power transmitter would have worked through terrestrial electricity or airborne Hertzian waves, but given the possible benefits, maybe now it's time the idea was reconsidered.

If Tesla could see us now, still struggling in the morass he hoped to lift us out of, he would probably recline in a chair, spin the wheels in his mind and pitch in to set it right.

next issue

PHOTO RADIO SHACK

COMPUTERS IN THE CLASSROOM

There's a revolution going on right now, and it involves young kids in elementary and secondary schools. These students are the first generation to be "computerized." School districts around the country are getting wise to the fact that the computer is destined to become an integral classroom tool. Many students already know this, and now teachers are seeing the beauty of this phenomenon. We'll take a look at how this quiet revolt is progressing, and some of the problems along the way.

PHOTO NASA

INTERVIEW: NEW NASA DIRECTOR JAMES BEGGS

Though the Reagan Administration is still mum on stating a firm space policy, they have installed a new manager of the federal space agency. Trudy Bell will sit down with the recently appointed Beggs and ask him some straightforward questions on exactly where this nation stands in the development of outer space. Specifically, Bell will inquire about the shuttle program, the Halley's Comet Mission, future planet probes, space sciences and the use of the military in space.

ART BILL HARTMANN

LIGHTSAILS

On the one hand, we want (and need) to explore and exploit the vast resources of space. On the other hand, the energy that will be needed to fuel the craft that will take us there may not be available. The answer to this paradox? Why not use the most available energy of all—the sun! Next issue, Eric Drexler takes a close look at lightsails: perhaps the most promising method yet for future travel around and beyond the solar system.

PHOTO PHILLIPE HALSMAN

J. ROBERT OPPENHEIMER

He was the genius behind the development of the atomic bomb, yet he spent the rest of his life trying to prevent other bombs from being built. He produced the weapon which may have won World War II, yet he ended his life accused of treason by the same men he had worked with. The career of J. Robert Oppenheimer is filled with such contradictions; and in FUTURE LIFE #31 we will try to unravel the tangle that occurred when the scientist stepped beyond the bounds of his science.

PLUS

Stan Kent, director of The Viking Fund and the Halley Fund, reports on last spring's important conference, "The Case for Mars".... An examination of the brave new weapons that science is creating for use and misuse by the world's military forces.... Ellison expresses his shock at both horror films and their audiences.... and, of course, the latest and greatest from Soundscapes, Alternate Space, Earth Control, space art, book reviews and Databank news.

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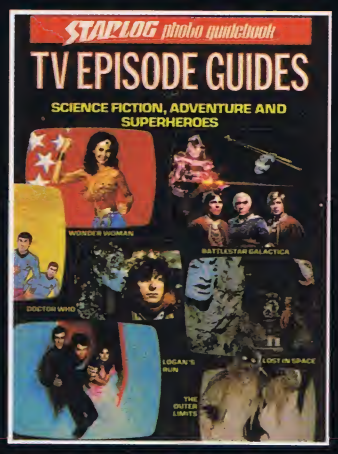

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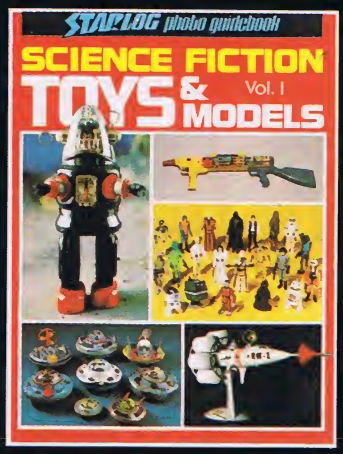

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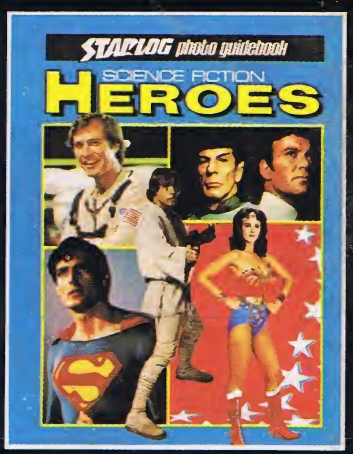

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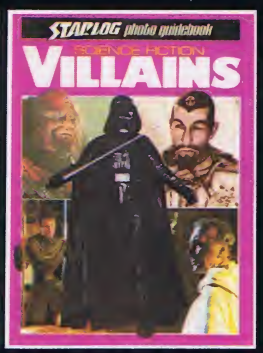

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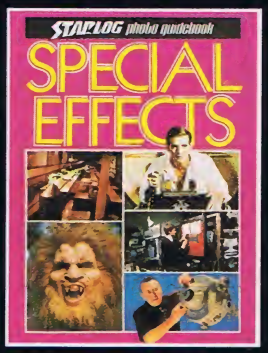

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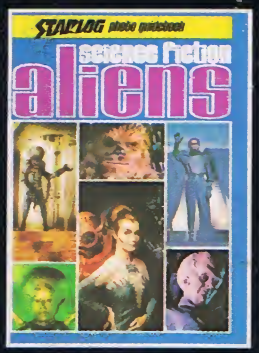

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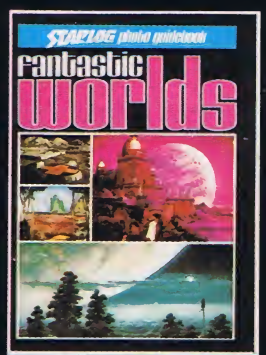

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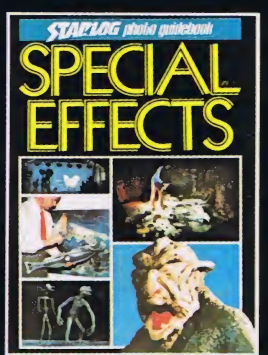

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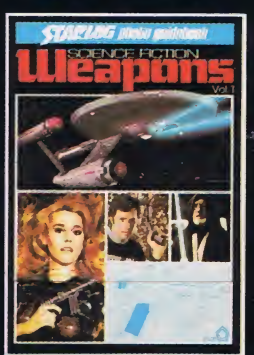

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